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THE AMERICAN

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VOL. 104 JANUARY, 1932 No. 1

EDITORIAL

1931—AND RESEARCH STILL PAYS DIVIDENDS

LAST YEAR we captioned an editorial, which carried the story of the progress of science during 1930, with the title "Wring Out the Old—Ring in the New."

At that time we were very certain that the old year deserved a wringing out—for it had been, in many ways, a dismal, dismal year. Just as sure, too, were we of the fulfillment of promises which hopeful humanity heaps on the coming year and so we bid the year 1931 a merry welcome—a real ringing in.

Now that the wisp of man-defined time called 1931 has faded, and a nice young year has come to take its place, we wonder whether we gave it, then, too effusive a welcome.

For it has left us a drab succession of memories. It will be remembered as the year of the Great Punishment—when the conceit and inflation of a decade of unbridled prosperity had to be spectacularly lost or deflated. It was the great year when a financial splurge became a scourge and our martial air a morbid, melancholy dirge.

Banks went up and stocks came down, industry stagnated, and capital wilted, labor lost to the robot, and assessments outdid dividends. All in all, 1931, unwept, unhonored and unsung, slunk into the shadows with few indeed to mourn its passing.

Yet even in such a period as this, research paid its usual dividends, and science kept marching on.

Read this—an annual recital † of the scientific accomplishments during the year just gone. Draw comfort from its reading—know that while man-made chaos caused us much discomfort—God guided, man-made progress also came in generous share.

†Compiled from data furnished in a copyright article by *Science Service*.

O. L. K.

Biology

Bacteria, visible under the microscope, were changed to invisible, filterable phases when Dr. Arthur I. Kendall, of Northwestern University Medical School, placed them in a new medium containing protein; he was also able to return them to visible form, and grew filterable viruses in the new medium, and, through the new Rife microscope, saw them as tiny oval blue bodies.

A new weapon to combat the dread disease paresis was made available to medicine when Dr. Federick Eberson and William G. Mossman, of Mount Zion Hospital in San Francisco, succeeded in growing artificially in the laboratory a harmless germ capable of causing a curative fever without itself producing any disease.

Six generations of the organism causing infantile paralysis were for the first time successfully grown outside the human body at Mt. Zion Hospital, San Francisco, by Dr. Frederick Eberson, director of the clinical laboratories.

The first United States plant patent was issued to Henry F. Bosenberg, of New Brunswick, N. J., for an everblooming rose derived from the familiar Van Fleet.

A true "plague of locusts" descended on parts of the West during the summer, in one of the worst "grasshopper years" of recent record; locusts were also troublesome in parts of the Old World.

In an effort to prevent the extinction of the wisent, or European bison, nearly wiped out as a result of the war, all the pure-blood cows of breeding age were removed from scattered zoological parks on the Continent and concentrated in a preserve in the Bialowicz Forest in Poland. Surplus males are being bred to American bison cows in another preserve at Springe, Germany, to build up a "reserve" stock of wisent-bison hybrids. The two stocks are to be kept strictly separated.

The extent to which so-called identical twins resemble each other depends upon the stage of development reached by the cell mass of the embryo at the time it separates to form the two distinct individuals, was the theory proposed by Dr. H. H. Newman, of the University of Chicago, who has found that Siamese twins look and act much less alike than do separate identical twins.

A physiological incompatibility was discovered to exist between some male reproductive elements and some female reproductive tissue which might account for childlessness where neither mate is sterile; this finding was made by Dr. Raphael Kurzrok and Prof. Charles C. Lieb, of Columbia University.

That a tendency to long life is inherited from long-lived ancestors was confirmed by Dr. Raymond Pearl and his associates in the department of biology of the School of Hygiene and Public Health of Johns Hopkins University.

Chemistry

Discovery of the last missing chemical element, eka-iodine, number 85, was announced by Prof. Fred Allison, Edgar J. Murphy, Prof. Edna R. Bishop and Anna L. Sommer at the Alabama Polytechnic Institution, who used the same method in claiming detection of element number 87 a year ago.

Discovery of element 87 was claimed by Prof. Jacob Papish and Eugene Wainer, of Cornell, who used the X-ray spectrograph.

Hydrogen atoms twice as heavy as, but otherwise identical with, ordinary hydrogen atoms, were detected by Prof. Harold C. Urey and Dr. G. M. Murphy, of Columbia, and Dr. F. G. Brickwedde, National Bureau of Standards.

Commercial production of a new synthetic rubber-like substance, with grease-resisting properties, was begun by the E. I. du Pont de Nemours & Company. Acetylene, formed from calcium carbide, is combined with hydrochloric acid and polymerized to give chloroprene.

Gold, platinum and five other chemical elements are mixtures of atoms chemically the same but different in weight, Dr. Fred Allison and Edgar J. Murphy, of the Alabama Polytechnic Institute, discovered using magneto-chemical analysis.

"Autosynthetic cells" which resembled closely living matter were produced in the laboratory by Dr. George W. Crile, of Cleveland.

Mechanical molecule models which enable the chemist to observe visually vibrations like those of the atoms and thus to obtain information regarding the motions were constructed by Dr. C. F. Kettering, director of General Motors Research Laboratories; Prof. D. H. Andrews, of Johns Hopkins University, and L. W. Shutts.

A rich deposit of pitchblende at LaBine Point, on the Great Bear Lake of Canada, bearing probably $7000 worth of radium to the ton, was found by Gilbert LaBine and Shirley R. Cragg.

A new essential to life, in addition to the twenty amino acids known as the chemical building blocks of necessary food proteins, was found in the casein or protein of milk by Dr. W. C. Rose, University of Illinois.

That the chemical para-ethoxy-phenyl-thio-carbamide is intensely bitter to some persons, but tasteless to others was discovered by Dr. Arthur L. Fox, du Pont chemist.

Prof. L. H. Snyder, of Ohio State University, and Dr. A. F. Blakeslee, of the Carnegie Institution of Washington, working independently, found the "taste blindness" to para-ethoxy-phenyl-thio-carbamide to be a recessive hereditary trait.

Amylase, a digestive ferment of the pancreas that acts on the starch in foodstuffs and makes it available for the energy needs of the body, was isolated in pure crystalline form by Prof. H. C. Sherman, of Columbia University, and his two associates, Prof. M. L. Caldwell and L. E. Booher.

A crystalline form of vitamin D called "calciferol" was prepared by a group working at the National Institute for Medical Research, London.

Protein crystals of great digestive power were isolated from trypsin, digestive ferment secreted by the pancreas, by Drs. John H. Northrop and M. Kunitz, of the Rockefeller Institute for Medical Research, helping to clear up the mystery of the chemical mechanism of digestion.

Methyl, the atomic grouping found in poisonous wood alcohol, was isolated as a free radical for a small fraction of a second by Prof. F. Paneth and W. Hofeditz, University of Königsburg, Germany.

Sir Robert Hadfield, father of modern alloy steels, revealed that analyses of seventy-nine specimens of steels and alloys belonging to Michael Faraday show that Faraday anticipated present developments of stainless and other special alloy steels.

Medicine

Despite the economic depression, the health of the country was generally good, the U. S. Public Health Service reported.

Life insurance statistics for the first eleven months showed the lowest death rate ever recorded for the United States and Canada.

A severe epidemic of infantile paralysis occurred, chiefly in New York, New England, New Jersey, Michigan, Minnesota and Wisconsin.

A sharp outbreak of influenza occurred during the first three months of the year.

Fleas were found to be carriers of typhus fever, previously thought to be carried only by the body louse, as a result of experiments

reported by Drs. R. E. Dyer, A. S. Rumreich and L. F. Badger, of the U. S. Public Health Service.

That death may be caused by a lack of magnesium in the diet through a disturbance of the adrenal glands was discovered by Dr. E. V. McCollum and Dr. Elsa Orent, of Johns Hopkins School of Hygiene and Public Health.

That the formation by the pituitary gland of a hormone governing certain sexual functions is in some way related to the manganese of the diet was discovered by Dr. E. V. McCollum, of the Johns Hopkins School of Hygiene and Public Health.

Discovery that deafness is caused by an unnatural increase or decrease in the rigidity of the tiny bones of the ear known as the ossicles and that pressure on the round window membrane of the ear increases the perception of spoken words and nearly all tones by 50 per cent. was made by Dr. S. J. Crowe, of the Johns Hopkins Hospital and Medical School.

A new type of deafness due to spasm of the bone and muscle apparatus of the middle ear and of the eardrum, and also a method of relieving it, was discovered by Dr. E. M. Josephson, of New York.

Persons may be rendered immune to diseases without developing a hypersensitiveness to the particular germ against which they are immunized, it was found by Dr. Arnold R. Rich, of the Johns Hopkins Medical School.

A new secondary, or portal, system of blood circulation conveying blood directly from the pituitary gland to the mid-brain was discovered by Dr. Gregor Popa and Una Fielding, of University College, London.

A forward step in the battle against leprosy was reported when Dr. Earl B. McKinley, of the George Washington University Medical School, and Dr. Malcolm H. Soule, of the University of Michigan, announced that they had isolated the organism which presumably causes this disease and had succeeded in growing it outside the human body.

Discovery of the hitherto unknown germ of smallpox was announced by Prof. J. C. G. Ledingham, director of the Lister Institute of London.

A new hormone, sympathin, similar to the powerful adrenalin, was discovered by Prof. Walter B. Cannon, of the Harvard Medical School, and is believed by him to be formed in the muscle cells by the action of an impulse from the nerves.

A serum was developed by Dr. W. C. Hueper, assisted by Miss Mary Russell, both of the Cancer Research Laboratory of the University of Pennsylvania, which may lead to the conquest of the fatal disease, leukemia, in which the white blood cells multiply riotously.

A reinforced attack on drug addiction was made by the U. S. Bureau of Narcotics, the U. S. Public Health Service, the American Medical Association and a special committee of the National Research Council; in the course of which two research laboratories were established, one at the University of Virginia for chemical analyses and syntheses of alkaloid substances, and the other at the University of Michigan for the biological testing of narcotics and their substitutes.

A new cascade 1,000,000-volt X-ray tube was made by the General Electric Company and installed at the New York Memorial Hospital to provide more intense radiation for cancer treatment than could be produced by all the world's available radium.

Evidence that Rocky Mountain spotted fever occurs on the eastern seaboard as well as in several western States was reported by Drs. R. E. Dyer, L. F. Badger and A. S. Rumreich, of the U. S. Public Health Service.

The wood tick which causes tularemia, Rocky Mountain spotted fever, and Colorado tick fever was found to be the cause of a strange type of paralysis in humans, dogs, sheep, foxes and to some extent in cattle by investigators of the U. S. Public Health Service.

A remedy for ringworm of the feet, popularly known as athlete's foot, was found in sodium thiosulphate by Dr. William L. Gould, of Albany, N. Y.

The successful use of digestive ferments to prevent the formation of adhesions was reported by Dr. Alton Ochsner and Dr. Earl Garside, of Tulane University.

The discovery that an extract of the parathyroid gland of cattle will restrict growth without injury to the health was made by a young English biochemist, J. H. Thompson, and may be of great value in the treatment of cancer.

Diet was found to be definitely not responsible for the development of cancer, as a result of experiments on mice conducted by Sir Leonard Hill, British scientist.

Efforts to find a diagnostic test for early cancer continued; Dr. S. G. T. Bendien, of Zeist, Holland, and Dr. Hans Jacques Fuchs, of Berlin, each announced one based on examination of the blood.

Two new anesthetics were announced: one, related to the well-known drug veronal, which puts the patient to sleep quicker and yet allows him to recover sooner, was produced by Dr. H. A. Shonle, of the Lilly Research Laboratories, from alcohol, barbituric acid, and amyl; the other, a general anesthetic related to ether and ethylene, but more rapid and efficient than ether, chloroform, or the anesthetic gases, was discovered, in accordance with its own prediction, by Dr. C. D. Leake, at the University of California Medical School.

A method of treating pellagra was reported by Dr. Ibrahim Sabry, of the Government Hospital, Alexandria, Egypt, who believes the disease to be caused by a poison found chiefly in beans instead of by a dietary deficiency as has been supposed.

Viosterol, or irradiated ergosterol, often given to children in place of cod liver oil, was found to be a new and effective treatment for radium poisoning such as that developed by workers on radium-dial watches, it was reported by Dr. Frederick B. Flinn, of Columbia University.

Improvement in the hitherto hopeless condition known as multiple sclerosis, or creeping paralysis, through use of high-frequency electric currents, was reported by Drs. William H. Schmidt and Benjamin Weiss, of Jefferson Medical College.

That calcium chloride relieves the intense pain of lead colic, gall-stone colic and ureteral colic, was discovered by Drs. Walter Bauer, William T. Salter and Joseph C. Aub, of the Massachusetts General Hospital, Boston.

Ergot, an important drug, which naturally grows only as a parasite on living plants, was successfully raised in a laboratory flask by Adelia McCrea, of the University of Michigan.

The danger of burns during X-ray treatments has been greatly lessened by the completion of apparatus designed by Dr. Lauriston Taylor, of the National Bureau of Standards, to measure the intensity of X-ray doses.

A new method for saving the lives of those who have swallowed the poison bichloride of mercury was developed by Dr. Samuel Berger, of Cleveland; it consists of an opening into the cecum, and a flushing with water through this opening.

A safe and apparently certain treatment for hookworm was found in the synthetic antiseptic hexylresorcinol by Dr. Veader Leonard, of the Johns Hopkins University.

Physics

A successful though inefficient method of tapping the energy of the atom nucleus to obtain synthetic cosmic rays was discovered by Dr. W. Bothe and Dr. H. Becker, of the University of Giessen, Germany, who bombarded metallic beryllium of atomic weight nine with alpha rays to obtain carbon atoms of atomic weight thirteen and of less energy.

The energy of the mysterious inner core of the atom is probably in quanta, or definite small amounts or parcels, just as it is on the outside, Drs. J. C. Chadwick, J. E. R. Constable and E. C. Pollard, of the University of Cambridge, discovered through a bombardment of atom nuclei with fast moving alpha particles from polonium.

X-rays can be made to produce a weak radioactivity in lead, causing its atoms to fly to pieces in a manner similar to the disintegration of spontaneously radioactive radium, it was discovered by a Russian scientist, Prof. G. I. Pokrowski, of Moscow.

New evidence for the theory that even atoms behave as though they were immaterial waves was secured when Dr. Thomas H. Johnson, of the Franklin Institute, Philadelphia, fired a stream of hydrogen atoms at the surface of a crystal of lithium fluoride and by observing the spread of the reflected atoms measured their wave length.

Construction of a high voltage generator which it is hoped will generate as much as 20,000,000 volts to be built up through the use of static electricity on silk belts, was begun by Dr. Robert J. Van de Graaff, of Princeton and the Massachusetts Institute of Technology, who completed a model giving 1,500,000 volts.

A verification of the famous Michelson-Morley experiment was performed at the Zeiss works at Jena by Dr. G. Joos, showing no ether drift through the atmosphere because of the motion of the earth.

A unification of the laws of gravitation and those of electromagnetism into a single mathematical theory, based on the famous "principle of least action," was proposed by Prof. Cornelius Lanczos, of the University of Frankfurt.

An X-ray tube built to withstand voltages as high as 2,600,000 was made of alternate rings of paper, rubber and aluminum by Drs. F. Lange and A. Brasch, of the University of Berlin.

Light which has been on its way from the distant nebulæ for some seventy million years is still traveling at the same speed as does light on the earth, Dr. Gustaf Stromberg, of the Mount Wilson Observatory, demonstrated.

Tracks made by cosmic rays in a cloud of vapor were made visible by Dr. L. M. Mott-Smith and G. L. Locher, of the Rice Institute, Texas, who conclude from a study of the paths that the rays must be composed of bullet-like particles.

The completion of what is probably the world's most powerful microscope, capable of magnifications up to 17,000 diameters, was announced by Dr. Royal Raymond Rife, of San Diego.

Helium was turned from a gas into a liquid for the first time in the United States by a group of physicists at the National Bureau of Standards, which included Dr. H. C. Dickinson, Dr. F. G. Brickwedde, W. Cook, R. B. Scott and J. M. Smoot.

A new theory which supplements the science of thermodynamics in fitting it to unexpected fluctuations at variance with the regularities covered by the second law of thermodynamics, was proposed by Prof. G. N. Lewis, of the University of California.

The rate of expansion of the universe was derived from the fundamental equation of the modern quantum theory by Sir Arthur Eddington, British astronomer, who thus linked the size of the universe and the mass of the electron and made the reality of the astronomically observed recession of the nebulæ more plausible.

X-rays were produced without the use of X-ray tubes, by M. G. Reboul, of the Physics Laboratory, Montpelier, France, by driving electric currents through solids like magnesia, alum, and yellow oxide of mercury, which have high electric resistance.

A computing machine for solving complex mathematical problems in the form of differential equations was made by Prof. V. Bush, of the Massachusetts Institute of Technology.

Evidence that electrons move about at high speeds in solid bodies was obtained by Dr. Jesse W. M. Dumond and Dr. Harry A. Kirkpatrick, of the California Institute of Technology through use of the Doppler effect.

An extension of the uncertainty principle to past events was announced by Prof. Albert Einstein, Prof. Richard C. Tolman and Dr. Boris Podolsky.

That the universe may be contracting and expanding in cycles of many millions of years without running the risk of a heat death through the operation of the second law of classical thermodynamics was indicated by studies on model mathematical universes by Dr. Richard C. Tolman, of the California Institute of Technology.

A gigantic burning glass made of nineteen lenses each two feet in diameter and nineteen smaller ones was designed by Dr. John A. Anderson of the Mount Wilson Observatory and Russell W. Porter to concentrate the energy of the sun's rays as much as 200,000 times so that a temperature of nearly 10,000 degrees Fahrenheit may be obtained.

A new laboratory for the study of magnetic forces at low temperature was added to the University of Cambridge, England, as the gift of the Royal Society of London.

Psychology and Psychiatry

Mental changes throughout the human life span were measured by Dr. W. R. Miles, of Stanford University by giving the same psychological tests to 720 persons ranging in age from 7 to 92.

A fundamental difference between the minds of humans and of monkeys is that humans are capable of symbolic thought while monkeys excel in mere habit formation, experiments completed by Dr. Louis W. Gellerman, of Yale, showed.

It is theoretically possible for inanimate matter to learn and remember in much the same manner that conditioned reflexes are formed in human beings, Dr. N. Rashevsky, of the Research Laboratories, Westinghouse Electric Company, demonstrated.

The generally accepted theory of how the sense of balance operates was upset when Dr. Franklin Fearing, of Northwestern University, found that portions of the semi-circular canal may be removed, preventing any flow of fluid through that part of the canal, without interfering with ability to maintain the equilibrium.

Measuring the pressure of infants' sucking was the new and completely objective method of finding the threshold of taste and temperature devised by Dr. Kai Jensen, of the Connecticut Agricultural College.

Behavior difficulties as well as reading and writing difficulties are caused, Dr. Ira S. Wile, of New York, reported, by the use of the right hand in naturally left-handed individuals.

The theory that stuttering is caused when neither hemisphere of the brain is sufficiently dominant and each half works independently causing confusion in the nervous system, was advanced by Dr. Lee Edward Travis, of the State University of Iowa.

Food preferences and aversions are not meaningless whims but tend to follow definite laws, Dr. Paul T. Young, of the University of Illinois, demonstrated with rats.

Memorizing material as a whole rather than split up in sections is easier only when it is a closely related whole, Dr. Leland W. Crafts, of New York University, found as a result of experiments.

An emotional and mental condition resembling the effects of alcohol or temporary insanity results from a lack of oxygen such as that experienced at high altitudes, it was found from experiments conducted at Columbia University by Dr. Ross A. McFarland.

A deficiency of iron in the brain cells of those who have died with the mental disorder dementia præcox was discovered by Dr. Walter Freeman, of St. Elizabeth's Hospital, Washington, D. C., and is believed by him to be a possible explanation of the symptoms of that disease.

A new theory that insanity depends upon the state of coagulation of the brain colloids was advanced by Dr. Wilder D. Bancroft and Dr. G. Holmes Richter, of Cornell.

A new use for small doses of the anesthetic sodium amytal was found by Dr. Erich Lindemann, of the Psychopathic Hospital, State University of Iowa, who discovered that it would make reserved persons, both normal and insane, talk freely.

More than a tenth of patients with the mental disease dementia præcox suffer from thyroid deficiency, it was estimated by Drs. R. G. Hoskins and Francis H. Sleeper, of the Memorial Foundation for Neuro-Endocrine Research, who reported success with the thyroid treatment for this disease.

Recognitions and Awards

The Nobel prize in chemistry was divided between Dr. Friedrich C. R. Bergius, of Heidelberg, and Dr. Carl Bosch, head of the German I. G. Farbenindustrie, for their development of the hydrogenation process of "liquefying" coal to obtain motor fuels, lubricating oils, methanol, and other chemical substances.

The Nobel prize in medicine for 1931 was awarded to Prof. Otto Warburg, of the Kaiser Wilhelm Institute for Biology, Berlin, for his important contributions in the fields of cancer, biological physics, and the respiratory function of the tissues.

Dr. William Wallace Campbell, director emeritus of the Lick Observatory and president emeritus of the University of California, was elected president of the National Academy of Sciences.

Dr. Franz Boas, of Columbia University, anthropologist, was elected president of the American Associaton for the Advancement of Science.

The Perkin medal was awarded by the American Section of the Society of Chemical Industry to Dr. Charles F. Burgess, of the Burgess Laboratories, Madison, Wis.

The Rumford Medal was awarded by the American Academy of Arts and Sciences to Prof. Karl T. Compton, president of the Massachusetts Institute of Technology.

For his researches on plant cultivation, including the taming of the wild blueberry, Dr. Frederick V. Coville, of the U. S. Department of Agriculture, was awarded the George Robert White gold medal of honor by the Massachusetts Horticultural Society.

Dr. Phillip Drinker and L. A. Shaw, inventors of the Drinker respirator which has proved invaluable in the treatment of infantile paralysis, asphyxiation, and diseases of the lungs, were awarded the John Scott Medal by the City of Philadelphia.

The gold medal of the American Medical Association was awarded this year to Dr. Jacob Furth, of the Henry Phipps Institute of the University of Pennsylvania, for his original investigative work on experimental leukemia, a fatal disease characterized by an increase of white blood corpuscles in the blood.

The Capper award founded by Senator Arthur Capper, of Kansas, consisting of a gold medal and $5000 cash, was given to Dr. L. O. Howard, former chief of the Bureau of Entomology, for his distinguished service in leading the army of science against the armies of insects that threaten man's crops, his forests, his house and his health.

Franklin Medals were presented to Sir James Jeans, British astronomer, and Dr. W. R. Whitney, director of the Research Laboratories of the General Electric Company.

The Willard Gibbs Medal was given to Dr. P. A. Levene, of the Rockefeller Institute for Medical Research, for his application of organic chemistry to biologic problems, especially in nucleic acids, amino sugars, and lecithins.

The Frederick Ives Medal of the Optical Society of America was awarded this year to Prof. Theodore Lyman, of Harvard, for his pioneer work in the ultra-violet spectrum of glowing hydrogen gas.

Dr. Henry Fairfield Osborn, president of the American Museum of Natural History, New York, was given the Daniel Giraud Elliot Medal for 1929, awarded this year by the National Academy of Sciences, in recognition of his monograph, "The Titanotheres of Ancient Wyoming, Dakota and Nebraska."

Linus Pauling, of the California Institute of Technology, who has made important applications of the quantum theory to chemistry, was the first recipient of a new award given by the American Chemical Society for research in pure chemistry conducted by persons under thirty-one years of age.

The 1931 Edison Medal of the American Institute of Electrical Engineers was awarded to Dr. Edwin Wilbur Rice, Jr., of the General Electric Company, pioneer in electrical engineering.

The first annual award given as a memorial to Dr. Thomas W. Salmon went to Dr. Adolph Meyer, noted psychiatrist of the Johns Hopkins Hospital, who delivered the Salmon Memorial lectures for the year and received an honorarium of $2500.

The Remington Medal for Conspicuous Services to Pharmacy was awarded to Prof. E. Fullerton Cook, of the Philadelphia College of Pharmacy and Science, for his outstanding work as chairman of the Revision Committee of the United States Pharmacopœia.

Dr. Harlow Shapley, astronomer and director of the Harvard Observatory, and Dr. William Crocker, botanist and director of the Boyce Thompson Institute for Plant Research at Yonkers, were the recipients of the 1931 medals for outstanding scientific achievement given by the Society of Arts and Sciences.

For their paper on high-voltage tubes, Dr. M. A. Tuve, Dr. L. R. Hafstad and Odd Dahl, of the Department of Terrestrial Magnetism of the Carnegie Institution of Washington, were awarded the $1000 prize at the Cleveland meeting of the American Association for the Advancement of Science.

The National Academy of Sciences awarded the Mary Clark Thompson Medal to Dr. Edward Oscar Ulrich, of the U. S. Geological Survey, for his outstanding contributions to geology and paleontology.

The first annual prize of $10,000 to be given by the *Popular Science Monthly* was divided between Dr. George H. Whipple, of the University of Rochester School of Medicine and Dentistry, and Dr. George R. Minot, of the Harvard University Medical School, for their development of the liver treatment of anemia.

The American Chemical Society's Nichols Medal was presented to John Arthur Wilson, industrial chemist of Milwaukee, Wis., for his outstanding achievements in colloid chemistry.

And we repeat, that Science—"still pursuing, still achieving"—compensates, a bit at least, for all the annoyances and all the unpleasant memories of the year which we have just "wrung out."

IVOR GRIFFITH.

SELECTED EDITORIAL

CHEMISTRY'S NEXT SERVICE TO MEDICINE*

MORE than a century ago Laënnec, writing in the first volume of the *Archives générales de médecine,*[1] remarked that the aim of medicine is the cure of disease. For the attainment of this end Laënnec singled out three pathways, described by Cohn [2] as (1) that of the empiricists, who considered it sufficient to distinguish diseases by their apparent signs, (2) that of those who believed it possible to disclose the causes of disease without giving themselves the trouble of learning their effects, and (3) that of those who believed it was necessary to understand the diseases. Cohn adds, by way of interpreting or perhaps of supplementing Laënnec's meaning, that we believe it necessary as the basis of therapeutics to understand the mechanisms, that is to say, the processes which underlie the manifestations of disease, for it is these which it is one of our functions to attempt to correct. That is our practical aim.

For a long time investigators in the domain of the medical sciences have been so deeply engrossed with the efforts to classify diseases and to discover their etiology that practical therapeutics has received somewhat niggardly attention in many quarters. Medical practice has passed through a stage of therapeutic nihilism of which some signs still remain.. Obviously, rational therapy depends on the knowledge secured by the intensive study of disease as such; but the relief of suffering and the temporary or permanent correction of defects are inevitable functions of the devotees of medicine. It is not always enough today merely to attempt to reinforce the patient's natural means of defense. The armamentarium of the open minded physician includes for therapeutic purposes drugs, foods, water, serums, vaccines, electricity, heat and cold, mechanical agents, rest, exercise, massage, climate, mental influences and, in fact, whatever physical, chemical and psychic agencies seem to be helpful. To the extent that he may be indifferent to most of these helps he is liable to deprive his patients of some real advantage in the attack on disease.

*Reprinted from *Jour. A. M. A.* 97:1892 (Dec.) 1931.

[1] Laënnec, R. T. H.: *Arch. gén. de méd.* 1:5, 1823.

[2] Cohn, A. E.: *Medicine, Science and Art,* Chicago, University of Chicago Press, 1931.

Students of medicine are sometimes resentful of what they regard as the intrusion of other disciplines or workers in other fields into their domain. This view has been expressed by Cohn in the assertion that a dependence on the outside world for the solution of its problems is in part a reproach to medicine. Probably no injury has yet been suffered, he adds, by society as a result of this dependence. But those advances which depend on knowledge of disease in patients and on actual direct contact with diseased persons have been made by the practitioners of medicine themselves. In this way is to be explained the significance of Sydenham, Jenner and Laënnec; they have taught the use of the classification of diseases, the fact that fevers are preventable, an approach to the diagnosis of visceral disease by means not immedately obvious. These have, after all, constituted the primary advances in medicine. It is this experience which encourages the belief, Cohn concludes, that the development of medicine is in all probability the work of physicians properly trained and supplied with adequate equipment.

In view of the foregoing, it might come as an unpleastnt surprise to one not thoroughly conversant with the facts of medical progress to read the title of an essay recently addressed to a group of chemical engineers. The caption was Chemistry's Next Service to Medicine. This contribution, by A. W. Rowe [3] of the Evans Memorial in Boston, deals with the indispensable rôle of the chemist in the preparation of hormones, those substances which are potent regulators of various important bodily functions, such as growth, development, nutrition and reproduction. From drugs to hormones is a relatively simple step. In its pride of accomplishment, medicine must bear in mind that the formal exact study of the action of drugs did not begin until within the lifetime of some living physicians. The first laboratory for the investigation of drugs was established at Dorpat in 1856. Yet chemists had extracted the alkaloid morphine from opium in 1817. Endocrinology, divested of much of its ignorance, misinformation and pretense, seems destined to be one of the major factors in medical progress in the days ahead. The contributions of the chemists in making replacement therapy possible when, as often happens, underproduction of certain hormones leads to the serious effects of endocrine disorder—to serious and even fatal changes in "function level"—deserve frank recognition. Rowe has recalled, for instance, that with

[3] Rowe, A. W.: "Chemistry's Next Service to Medicine," *Indust. and Engin. Chem.* 23:1176 (Oct.) 1931.

their powerful influence on the basic functions of protoplasm any abnormal secretory activity of the individual gland leads to an abnormal expression of those functions over which it exercises a regulating power. End-results such as gigantism, dwarfism, extreme obesity and emaciation, infertility, marked changes in mentality and in the secondary characteristics of sex, and a wide variety of other striking manifestations are thus produced.

The preparation of therapeutically available products representing "active principles" of endocrine tissues has been the contribution of the chemical laboratory. The hormones themselves are only a small part of the individual glandular masses or secretions. Isolation of the potent from the extraneous constituents has often involved great difficulty. Success in the chemical identification of the active components paves the way for chemical synthesis whereby freedom is won from dependence on animal sources often difficult to control. This again is a chemist's job. Rowe has presented challenges to the chemist engaged in this field. The first major problem, he points out, is in the isolation of active extracts, and this has been by no means a simple one. Some of the compounds, at least, are highly labile products and may be destroyed during the processes of extraction by the chemical agents used or even by other materials produced in other portions of the same gland from which they are derived. That insulin, the active material from the islands of Langerhans, a part of the pancreas, is destroyed by the digestive enzymes produced by other cells of the same gland is an illustration of the latter condition. A second problem of moment lies in the standardization of these active principles so that the dose administered may be estimated with some degree of precision. Existing in the organism, as they do, in small quantities and in concentrations capable of producing profound physiologic response, it is essential that means be devised to assay their potency. Even today, many preparations are given on the basis of so many grains or milligrams of the fresh or dried substance without any index of the real content of active material.

A further challenge to the chemist lies in the need of reducing the costs of products now attained through expensive processes of manufacture from unabundant materials. This has an economic rather than a purely scientific import; it is none the less important in the day's work of the physician. Rowe points out that the recently prepared extract from the suprarenal cortex, which has been demonstrated to be effective in Addison's disease, costs about $3000 a year for the

amount necessary to treat a single case. Even in those glandular failures in which the replacement therapy is at a minimum cost level through reasonably large supply of raw material and efficient methods of preparation, it can easily reach $100 a year, a far from negligible sum for a large group of wage earners. Epinephrine and thyroxine can now be produced synthetically. Further progress of this sort will represent contributions the importance of which scarcely needs debate. Rowe further says that adequate amounts of pure standardized chemical entities of established quantitative physiologic activity at reasonable cost will enable physicians to produce an enormous alleviation of human suffering, prolong life, and maintain physical efficiency. Let us not discourage what seems to some as an "intrusion" of the chemist into the domain of medicine.

ORIGINAL ARTICLES

THE SOLUBILITY OF BEESWAX.

By James J. Deeney.

BEESWAX dissolves but very slowly in the various solvents at 25 degrees C. The rate of solution of the wax, in fact, is so uncertain, that even after days it is impossible to tell whether or not the solvent is saturated. One part of beeswax when kept in contact with thirty parts of chloroform, which is the best solvent for this wax, required nearly one hour at 25 degrees C. to dissolve completely. A similar ratio of beeswax and ethyl ether failed to produce a clear solution even after two days. The ether caused the wax to disintegrate and appeared to exert a selective solvent action on certain constituents of the wax. One part of beeswax to one hundred parts of fixed oil (linseed oil) and a similar ratio of wax to volatile oil (oil of rosemary) did not seem to exert any appreciable solvent action even after several days. On the other hand, one part of wax was found to be completely soluble in thirty parts of carbon disulphide or benzene in the cold (25 degrees C.). All this, despite the fact that the U. S. P. states: "It (beeswax) is completely soluble in chloroform, ether, and in fixed and volatile oils; partly soluble in cold benzene and carbon disulphide and completely soluble in these liquids at about 30 degrees C."

Since this method of digesting the beeswax and solvent in the cold (25 degrees C.) gave uncertain results and required a prolonged period of time for completion, the author endeavored to develop a method which would not only be more rapid, but would give a more accurate determination of the solubility of the wax at 25 degrees C. For purposes of comparison a series of tests were made by digesting the wax in the cold (Method I), as well as by the procedure thought to be more adaptable for determining solubility ot waxes. (Method II).

Method I: A definite amount of solvent is weighed out carefully in a 24 x 200 mm. test tube. This solvent is brought to a temperature of 25 degrees C. and an accurately weighed amount of wax, in very small pieces, added. The test tube is tightly corked and placed in a water bath which serves to keep the temperature constant at 25 degrees C. during the entire test. At frequent intervals the tubes are

agitated and observations as to the solubility of the wax are made over a period of two days.

Method II: A definite weight of solvent is weighed in a 250 cc. round-bottomed flask and an accurately weighed amount of beeswax added. The flask is attached to a reflux condenser and the solvent heated gently until the wax is just completely dissolved. The flask is then allowed to cool. The solution of the wax is then poured into a test tube and the congealing point determined. Subsequent tests are then made, and the ratio of wax to solvent determined which will remain completely dissolved at 25 degrees C. but congeals at 24 degrees C.

By Method II, beeswax was found to be freely soluble in chloroform, carbon tetrachloride, benzene and carbon disulphide; soluble in petroleum ether and oil of turpentine; partly soluble in ether and alcohol; and very slightly soluble in acetone and fixed oil. By Method I, beeswax was found to be soluble in chloroform, carbon tetrachloride, benzene, and carbon disulphide; sparingly soluble in petroleum ether and oil of turpentine and insoluble in acetone and fixed oils.

As volatile oils may consist almost wholly of terpenes, phenols, ketones, aldehydes, etc., the solubility of beeswax differs considerably with the chemical composition of each oil. Solubilities referring to the volatile oils as a class should not be stated.

The following is a tabulation of results obtained:

Solvent	Parts Solvent	Soluble in Cold (25° C)	Refluxed and Cooled 25° C	Congealing Point
Choloroform	30	Completely Soluble	Completely Soluble	14° C
Chloroform	10	Partly Soluble	Completely Soluble	19° C
Chloroform	5	Partly Soluble	Completely Soluble	24° C
Carbon Tetrachloride	30	Completely Soluble	Completely Soluble	14.5° C
Carbon Tetrachloride	10	Partly Soluble	Completely Soluble	20° C
Carbon Tetrachloride	8	Partly Soluble	Completely Soluble	24° C
Carbon Tetrachloride	5	Partly Soluble	Partly Soluble	32° C
Benzene	30	Completely Soluble	Completely Soluble	14.5° C
Benzene	10	Partly Soluble	Completely Soluble	20° C
Benzene	6.5	Partly Soluble	Completely Soluble	24° C
Benzene	5	Partly Soluble	Partly Soluble	26° C
Carbon Disulphide	30	Completely Soluble	Completely Soluble	13.5° C
Carbon Disulphide	10	Partly Soluble	Completely Soluble	20° C
Carbon Disulphide	8.5	Partly Soluble	Completely Soluble	24° C
Ethyl Ether	100	Completely Soluble	Completely Soluble	...
Ethyl Ether	35	Partly Soluble	Completely Soluble	24° C
Ethyl Ether	30	Partly Soluble	Partly Soluble	26° C
Petroleum Ether	100	Completely Soluble	Completely Soluble	15° C
Petroleum Ether	30	Partly Soluble	Completely Soluble	24.5° C
Acetone	100	Insoluble	Insoluble	...
Acetone	30	Insoluble	Insoluble	...
Ethyl Alcohol	100	Partly Soluble	Partly Soluble	...
Ethyl Alcohol	30	Partly Soluble	Partly Soluble	...
Fixed Oils (Linseed)	1000	Very Slightly Soluble	Completely Soluble	...
Fixed Oils (Linseed)	100	Very Slightly Soluble	Partly Soluble	32° C
Fixed Oils (Linseed)	30	Very Slightly Soluble	Partly Soluble	44° C
Volatile Oil (Oil Rosemary)	1000	Completely Soluble	Completely Soluble	...
Volatile Oil (Oil Rosemary)	100	Partly Soluble	Completely Soluble	...
Volatile Oil (Oil Rosemary)	30	Partly Soluble	Partly Soluble	...
Volatile Oil (Oil Turpentine)	100	Completely Soluble	Completely Soluble	14° C
Volatile Oil (Oil Turpentine)	30	Partly Soluble	Completely Soluble	24° C
Volatile Oil (Oil Turpentine)	10	Partly Soluble	Partly Soluble	28° C

DIFFERENTIATING LIGHT FROM HEAVY MAGNESIUM OXIDE.

By James J. Deeney.

THE U. S. P. X describes Magnesium Oxide as a "white, very bulky, odorless powder . . . ." Heavy Magnesium is described as a "white, dense, odorless and very fine powder which meets the requirements of tests for identity, purity, and assay under Magnesii Oxidi." Thus with the words "very bulky" and "dense" this book of standards attempts to differentiate between the light and heavy oxides.

Magnesium Oxide is "very bulky" when compared with Heavy Magnesium Oxide and Heavy Magnesium Oxide is "dense" when compared with Magnesium Oxide. This was probably the thought when wording the descriptions given in the U. S. P. X, or in other words, a standard of comparison was formed in the mind but not expressed.

The U. S. P. X standardizes these oxides by means of chemical assay, but does not give a method of differentiating between the light and heavy oxides which are of identical chemical composition but of widely different physical properties. Since Magnesium Oxide is "very bulky" and Heavy Magnesium Oxide is "dense," we ought to be able to attack this problem of differentiation from two angles: By weighing definite volumes of the oxides we arrive at their relative bulking value, and again by wetting with a measured quantity of water or some other liquid we can determine relative values which depend largely on the amount of surface exposed by the oxides. The following methods incorporate the foregoing ideas:

I. *Determination of Dry Bulking Value:* A regular type weighing bottle, 30 mm. x 60 mm., without the ground glass stopper, is calibrated as a specific gravity bottle, the weight of the empty bottle and the approximate weight of water (at 25 degrees F.) required to completely fill the bottle being determined. The bottle is then filled to one-quarter of its capacity with the oxide and tapped gently on table or pad twenty times while rotating bottle to cause uniform settling of oxide. The bottle is then filled to one-half its capacity and this tapping twenty times while rotating repeated. Likewise when three-quarters full and completely full this process of tapping and rotating is again repeated in an identical manner; finally enough oxide is added to fill the bottle and the surplus leveled off with spat-

ula. The weight of the oxide is ascertained and calculations made to determine the amount of oxide which would be required to occupy the same bulk as 100 grams (100 cc.) of water.

II. *Determination of Water Absorption Value:* This method is similar to Gardner's "Oil Absorption Value" determination which is used in the valuation of pigments—the only difference being that water is used in place of linseed oil. Weigh exactly five grams of Light Magnesium Oxide in an ordinary plain jelly glass and add distilled water from a calibrated burette, five cc. at a time, until a total of 15 cc. are added. Distribute the water evenly over the entire surface and after each addition mix lightly, but do not use any pressure, just throw the unwetted oxide over the wetted material. Continue adding the water slowly mixing lightly until a ball of completely wetted oxide is just formed. This denotes the end point—read from burette the amount of water used. This reading, multiplied by twenty, gives the cc. of water required to wet 100 grams of oxide. When determining the water absorption value of Heavy Magnesium Oxide, twenty grams are taken instead of five, since this oxide is approximately four times as heavy as the light oxide.

Samples of Magnesium Oxide examined, gave Dry Bulking Values of 12.2, 12.6 and 12.8 grams per 100 cc. while water absorption values varied from 356, 368 and 370 cc. per 100 grams. Samples of Heavy Oxide of Magnesia gave dry bulking values of 44.7, 46.2, and 47.4 grams per 100 cc., while water absorption values varied from 91.4 to 95.6 cc. per 100 grams.

The method used for determining the Bulking Values of the oxides while not strictly a scientific method has been patterned after a method adopted by the A. S. T. M. for determining the apparent specific gravity of sand. The water absorption values give more accurate results than the bulking value determinations and can be checked more closely. Magnesium Oxide and Heavy Magnesium Oxide can not only be distinguished by these methods, but the individual oxides could be standardized as to physical properties. This, of course, would entail examination of many samples of Light and Heavy Oxide from the various manufacturers before deciding on a required range of bulking and water absorption values.

THE HISTORY OF QUININE*

By Charles H. LaWall, Sc. D., Ph. M.
Dean of the Philadelphia College of Pharmacy and Science

THE HISTORY of quinine has never been recorded. It probably never can be completely written. The actual discovery of this important therapeutic agent burst upon the medical and pharmaceutical professions with such suddenness, after many false trails had ended in failure for their followers, that earlier commentators overlooked many important factors, and none of the later writers has ever taken the trouble to investigate and record the whole story, so far as my search of the literature would indicate.

The history of quinine may be described as one would describe a play or a drama—a "Comedy of Errors" it might be called, for while science is exact and her laws are immutable, workers in science are but human, although out of their ignorance frequently proceeds knowledge and the by-products of misdirected research are often more valuable than the original object of the search would have been if attained.

This play or drama of the history of quinine has a prologue which is concerned with the history of and traditions concerning cinchona, the drug from which quinine is obtained. The prologue does not illustrate comedy but rather symbolizes tragedy. In this prologue will be found the contending factors of professional intolerance and jealousy, religious bigotry and antagonism, commercial competition and greed, racial opposition and rivalry—all striving at cross purposes.

Scientific and professional interest is temporarily driven into outer darkness by selfishness and empiricism. It seems for a time as though the prologue would end in being the play itself. Years pass; the earlier portions of the drama have been enacted nearly three centuries, when suddenly the stage is set for the main drama by the discovery of quinine in 1820, and a new era in medicine is made possible.

I shall not weary you with a repetition of all the details of the prologue. The story has been written so often and is available in so many sources and forms that I feel it necessary to give only a brief outline of the salient facts. The *dramatis personæ* appear in the following order:

*Presented to the Section on Medical History of the College of Physicians of Philadelphia, Monday March 9, 1931.

An Indian medicine man near Loxa in Peru.

A Jesuit missionary in the district about Loxa.

Don Lopez de Canizares, the Spanish Corregidor of Loxa.

Ana de Osorio, Countess of Chinchon, wife of the Viceroy of Peru.

Dr. Juan de Vega, physician to the Countess of Chinchon.

SCENE I. The time of the rising of the curtain is about 1630. This scene covers a period of about ten years.

The Indian medicine man taught the Jesuit missionary the use of the drug (cinchona) and the missionary taught others in the community, the Spanish Corregidor, Canizares, thus learning of its use. The Countess of Chinchon was stricken with a fever, probably malarial, in 1638, and the physician, Juan de Vega, quickly cured her with the "bark" sent to him by Canizares. Shortly after her recovery the Countess returned to Spain, in 1640, taking with her some of the drug, which came to be known as *Polvo de la Condesa,* or the Powder of the Countess. Her Peruvian physician, Juan de Vega, followed the Countess to Spain soon after, taking with him large supplies of the bark which he sold at the extremely high price of 100 reals a pound.

In the meantime, the Jesuit fathers independently introduced the drug into Europe, whence the name "Jesuits' Powder" and "Jesuits' Bark," which has remained with us as a synonym throughout these four centuries. Inasmuch as the drug was distributed free of charge to fever sufferers by Cardinal de Lugo of Rome in 1643, the drug also came to be known as "The Powder of the Cardinal." The country of its origin obviously supplied the synonym "Peruvian Bark," and as the native name for any bark is *quinia,* sometimes spelled *quina,* and for this particular bark was *quinia-quinia,* or "bark of barks," the drug came to be referred to simply as "bark," and as it varied in color with the species there appeared also the logical synonyms "red bark," "yellow bark," etc.

Now, while this foregoing scene might give one the impression that the early history of cinchona is known with chronological exactness, let it be explained here that there are discrepancies and doubts that have been cast upon this generally accepted account of the main facts. The authors who have summarized the information regarding cinchona most succinctly are Flückiger in his "Pharmacographia," published in collaboration with Hanbury in 1874, and John Uri Lloyd in his "Origin and History of Pharmacopeial Vegetable Drugs," pub-

lished in 1921. Both of these authorities point out that writers and travelers, from Arrott (1737), De la Condamine (1738), and Jussieu (1739), who were the earliest investigators of authority, down through a list including Irving (1789), Humboldt (1807), De Candolle (1824), Poppig (1830), Weddell (1849), Spruce (1861), Markham (1862), and Wellcome (1879), had brought back very conflicting stories. Some state that the drug is not now used nor ever has been used by the natives of South America for medicinal purposes, but only for dyeing.

Henry Wellcome (1879) pointed out, however, that he believed the use of cinchona had always been known to the natives, but that they were secretive, as is the case with all primitive peoples, and especially in this case towards their cruel oppressors, the Spaniards. He also points out that the native name, *quinia-quinia,* implies the possession of medicinal properties (literally, the bark of barks), and Markham made the same observation.

It will be interesting to note here that there is no etymological relationship between the names "cinchona" and "quinia." The name "cinchona" which was the name given by Linnaeus to the genus in honor of the Countess of Chinchon, has also been the subject of controversy as to whether Linnaeus left out the first "h" from ignorance of the correct spelling or for the sake of euphony.

We are now ready for Scene II of the prologue. The time of this scene covers the several centuries which elapse from about 1640, when the bark was first brought to Europe, until the beginning of the nineteenth century, just prior to the discovery of quinine. The *dramatis personæ* are as follows:

Charles II of England (1660 to 1685).

Louis XIV of France (1643 to 1715).

Robert Talbor (alias Tabor), a quack and physician in ordinary to Charles II in 1678.

Gideon Harvey, M. D., 1683, outspoken opponent of the use of cinchona in medicine.

Thomas Sydenham, M. D., 1686, stabilizer of the cinchona controversy.

John Huxham, M. D., 1755, originator of the most famous preparation of cinchona.

Paracelsists and Galenists, physicians constituting the mob or chorus, as you prefer.

The period immediately following the introduction of cinchona was a hectic controversial period. Not only was the factor of religious prejudice raised to the *nth* power by the introduction of the drug generally under the name "Jesuits' Powder," but the Galenists spurned the drug because it had not been described and used by the master whose dead hand still rested heavily on the profession of medicine, even though nearly fifteen hundred years had passed. This gave the Paracelsists a chance to come back, and a bitter professional warfare resulted.

Flückiger says that the earliest account of the introduction of Peruvian Bark into Europe was contributed by Chifflet, physician to the Archduke Leopold of Austria, in a work entitled *Pulvis Febrifugus Orbis Americani ventilatus,* published in Brussels in 1653. Chifflet reports that the Spanish call the drug "Palo de Calenturas," which he translated into Latin as *Lignum Febrium.* He calls the bark *China Febris,* and states that it was brought from Italy (where it had been introduced by Cardinal Joannes de Lugo) to Belgium by the Jesuit fathers who attended a meeting in the latter country for the election of a general, and that it was also brought thence by Michael Belga, who had resided for some years at Lima.

Chifflet's article started an acrimonious controversy which was participated in by nearly a dozen physicians of great prominence and reputation and which lasted for nearly a decade. Some supported the use of the bark and declared that it had great merit, others spurned it as valueless or even actually harmful. In 1655 the drug was introduced into England and for some years was advertised as a cure for epidemic remittent fever as "the excellent powder known by the name of the Jesuits' Powder."

Flückiger mentions Brady, a professor of physics at Cambridge, as prescribing "bark" about this time and that Willis, a physician of eminence, reported it as coming into daily use. This latter statement may be correct, but as late as 1674 Willis makes no mention of cinchona in his *Pharmaceutice Rationalis.* Some years later, however, he wrote favorably concerning it.

In 1672 there appeared upon the stage of this drama an individual named Robert Talbor (or Tabor, for he seems to have used both names). He passed directly from an apothecary's apprenticeship to the practice of medicine, without the formality of an education in the latter profession. He first practiced in Essex and later in London, and in 1672 published a small work called "*Pyretologia,* a rational account

of the cause and cure of agues." In this work he does not divulge the ingredients of his prescription and even cautions his readers against the dangerous effects of Jesuits' Powder when administered by unskilled persons, although he admits that properly given "it is a noble and safe medicine." He had both effrontery and friends at court, and prevailed upon Charles II to make him "Physician in ordinary" to the King, and he was later knighted by the same sovereign, but whether the latter honor preceded or followed his curing of His Majesty of a tertian fever by means of his secret remedy cannot be stated with certainty.

As Talbor was not even a member of the eminent College of Physicians, that organization protested against his being permitted to practice, but was restrained from action by the King, who intervened in behalf of Talbor, much to the chagrin and disappointment of the reputable and properly qualified physicians of England, and later of France, for in 1680 he visited the court of Louis XIV and cured the Dauphin of an attack of fever as well as rendering relief to other eminent persons suffering from the same affliction.

This brought him into high favor with Louis XIV, who induced him, for a reward of 2000 louis d'or and an annual pension of 2000 livres, to reveal his secret to the King's medical staff. Talbor died in the next year, 1681, and after his death Louis XIV ordered the details of Talbor's secret to be published, which was done in 1682 by one of the King's physicians in ordinary, Nicholas de Blegny. The remedy proved to consist principally of cinchona bark, the mixture being administered in large doses infused in wine. This revelation of the secret remedy was translated into English in the same year.

In the meantime, cinchona had been officially adopted into the London Pharmacopœia in 1677 under the title *Cortex Peruanus.* This latter recognition was probably due to the influence of Sydenham, who in 1666 had spoken highly of cinchona.

Gideon Harvey, who was a medical attendant on Charles II in his exile, and subsequently physician to William III, took up the cudgels for the anticinchona group and wrote viciously and bitterly concerning the subject, proving (?) to his own satisfaction if not to that of posterity, that "Jesuits' Powder never yet cured any remitting fever," but that "physicians who use it have killed thousands." He also says, "Agues cannot be termed cured by Jesuits' Bark, but only stopped. The fits upon some short interval do return. Worse diseases are engendered, as Dropsy, Consumption, Scurvy or twenty other dis-

tempers that either render the party his whole lifetime crazy or kill him outright."

In reply, Sydenham said, "But the said bark has got an ill name, I suppose for these reasons chiefly: First, because all the dreadful symptoms that attend an ague, when it has tormented a man a long time are imputed to the bark, when he scarce has used it once." Sydenham evidently believed in giving uncompounded medicines, for he also said, "to add anything to the bark argues either ignorance or craft."

By the beginning of the eighteenth century, however, much of the prejudice against cinchona had disappeared, doubtless due to Sydenham's support of the drug. The eminent Radcliffe, physician to Princess Anne of Denmark, and patron of Mead, who inherited his practice, used cinchona in a "febrifuge julap," which contained besides cinchona black-cherry water, compound peony water and syrup of maidenhair fern, the draught to be taken "every third hour for eight times out of the fit." Boerhaave, like Sydenham, used cinchona in uncompounded form as a wine, a decoction, an electuary, a syrup, and in the form of pills.

It was John Huxham, of Plymouth, England, whose "Essay on Fevers," published in 1755, led to the adoption of the Compound Tincture of Cinchona in 1788, as an official preparation in the London Pharmacopœia, and this cinchona-containing preparation, official in the United States and British Pharmacopœias, is still known as Huxham's Tincture after nearly 200 years of continuous use.

We are now ready to describe the stage setting for the drama itself, which may be presented in two scenes.

Scene I. The action begins in about the middle of the eighteenth century and continues down to the middle of the nineteenth century. The *dramatis personæ,* in order of their appearance, are as follows:

Count Claude de la Garaye, a French pharmacist who thought he had discovered the active constituent of cinchona in 1745.

Dr. Westerling, a Swedish physician, who labored under a similar delusion.

A. F. de Fourcroy, a famous French chemist, who almost discovered quinine but did not follow his researches to the end.

Claude Louis Berthollet, one of France's most eminent chemists, friend of Napoleon, who repeated Fourcroy's work, and drew entirely erroneous conclusions from his unfinished research.

LOUIS NICOLAS VAUQUELIN, Director of the School of Pharmacy in Paris and discoverer of the metal chromium, who followed in the false trail blazed by Fourcroy.

SEGUIN, an assistant of Fourcroy, who discovered morphine prior to Serturner but never published his paper and who, through a misinterpretation of a chemical reaction, believed and taught that gelatin was the active principle of cinchona.

DR. GOMEZ, a Portuguese chemist who in 1811 described a crystalline substance which he obtained from cinchona bark and named it cinchonino, thinking that it was the active principle of the bark.

JOSEPH PELLETIER:

JOSEPH BIENAIME CAVENTOU: French pharmacists who first isolated, described, and named quinine in 1820.

PIERRE J. ROBIQUET, who looked for quinine in coffee, and found caffeine instead.

PHYSICIANS and others who aided in introducing the new remedy and establishing its composition.

The investigation of vegetable drugs to determine, if possible, a concentrate, quintessence, or active principle, had been carried on more or less unscientifically and empirically from about the middle of the seventeenth century. Opium and cinchona were the drugs which were experimented with most frequently in many ways which seem to us ridiculous, as indeed they were. Even the great Robert Boyle essayed to discover an active principle of opium. These were the days when distillates reigned supreme and of course, distillation was tried on both of the drugs mentioned, with negative results from the therapeutic standpoint, for none of the active constituents of these drugs are volatile.

In 1745 Count Claude de la Garaye, a French pharmacist, juggled aqueous decoctions of cinchona and after getting rid of much extractive matter by fractional precipitation and filtration, evaporated the final filtrate on a waterbath and obtained transparent scales of an extract which he called *sel essentiel de quin-quina* (essential salt of cinchona). A similar discovery was made by two other French pharmacists, Buquet and Cornette, a few years later. This essential salt of cinchona had a vogue in medicine and pharmacy for some years. The method of preparing it was described in great detail by Baumé in his Elements of Pharmacy, which went through five or six editions in the latter half of the eighteenth century. We know now that the manipulative details

caused the precipitation and rejection of much of the real activity of the bark, and that the preparation made by this method consisted almost entirely of quinic acid, an oxidation product of quinine in combination with lime. In 1782 a Swedish physician named Westerling stated that he had discovered the active principle of cinchona. It was found that this so-called active principle was nothing but cinchotannic acid, entirely devoid of antiperiodic qualities. Fourcroy, a rival of the great Lavoisier, and according to Sir William Tilden (Famous Chemists, 1921), a contemptible character, who after having aided the revolutionists in bringing Lavoisier to the guillotine, delivered a glowing eulogy of the latter at the memorial services held in his honor, made several attempts to isolate the principles of cinchona bark. His first attempt in 1790 resulted in the separation of resinous matter mixed with the characteristic coloring principle of cinchona. This precipitate is now known as "cinchona red," but Fourcroy for a time believed and claimed that he had separated the active principle of the bark. Vauquelin, who was among the later noted workers in the field of alkaloids, followed this false lead of Fourcroy's and missed his way to the real goal. Vauquelin applied the method of Fourcroy to the examination of eight different species of cinchona, and in that way he contributed to the later success of Pelletier and Caventou.

In 1792 Fourcroy observed that water that had been macerated with the bark turned litmus paper blue and also that lime water produced a greenish precipitate in the infusion. If he had pursued *this* investigation further with the cleverness and scientific accuracy shown by Pelletier and Caventou he might have discovered what we now call quinine. As it was, he was content to stop at this point with the following very pertinent and (in part) prophetic observation: "These researches will no doubt lead to the discovery one day of an antiperiodic febrifuge, which once known, may be extracted from various vegetables. Fourcroy's work, which was called a "grande dissertation," was for a long time regarded as a model of analytical procedure for vegetable substances.

Berthollet, another famous French chemist of the Napoleonic period, who accompanied that monarch to Egypt, took up this phase of the investigation but erroneously concluded (without scientific proof) that magnesium compounds in the bark were responsible for the precipitation, and abandoned the quest as profitless.

The next participant in the comedy was the clown or low comedian of this particular cast. Seguin was assistant of Fourcroy, and made

two of the greatest errors in the history of plant chemistry. Seguin was a worthy pupil of Fourcroy, according to some historians, who state that he was penalized by Napoleon for having enriched himself in connection with supplying substandard drugs to the armies of France.

The first error was concerned with the discovery of morphine, for in 1804 Seguin read a paper before the French Institute in which he described a process that would have yielded morphine. This paper, for some unknown reason, was not published until 1814. In the meantime, Friederich Wilhelm Adam Sertürner, a pharmacist with a French family name living in the German city of Eimbeck, Hanover, published the first authoritative and accurate paper on the constituents of opium, in 1806, which was followed in 1816 by a final paper in which he described not only the alkaline base *morphium,* but also the organic acid (meconic) with which it is combined in the drug. This error of Seguin's was one of judgment and not of scientific ability. His error in connection with the chemistry of cinchona, however, was ridiculous and inexcusable.

Having observed that a solution of tannic acid produced a precipitate when added to a solution of gelatin (which precipitation is essentially the basis of the leather tanning industry), and also that the same acid produced a precipitate with an infusion of cinchona, which precipitation would have also been obtained with many other vegetable, including opium infusions, had he tried it, and which is due to the fact that the tannates are the least soluble salts of most alkaloids, Seguin concluded, without further experimentation, that gelatin was the active medicinal constituent of cinchona and should be substituted for it as a therapeutic agent. In Paris' *Pharmacologia,* 4th edition, 1824, this blunder is discussed and Paris states that certain noted physicians in France, Italy, and Germany, gave their patients clarified glue in intermittent fevers until the error was refuted.

It was Gomez of Lisbon, whose work directly inspired the researches of Pelletier and Caventou. These researches, which culminated in 1811, were published under the title: "Ensaio sobre o cinchonino e sobre sua influencia no virtude da quina e d'outras cascas." (Mem. da Acad. R. das Sciencias de Lisboa III, 1812-202, 217.)

Gomez extracted a substance from gray cinchona bark by treating an alcoholic extract with water, precipitating with potassium hydroxide and crystallizing the precipitate from the alcoholic solution. He named the product "cinchonino," which was anglicized to cinchonine. It is

said that a Dr. Duncan of Edinburgh had previously prepared a crystalline substance from cinchona by a similar process to that of Gomez, and had named it cinchonine. This statement cannot be verified, but it is certain that neither Gomez nor any other investigator until the time of Pelletier recognized the basic character of the substance.

If Gomez had conducted his researches upon "yellow bark," *Cinchona cordifolia,* instead of gray bark, the procedure which he followed would have yielded practically pure quinine, and he would have gained credit for the discovery instead of Pelletier and Caventou.

Some years later, Thenard's associate, Horton-Labilliardiere, repeated Gomez's experiments and noted the basic properties of cinchonino and informed Pelletier and Caventou. They in turn, being inspired by the then recent publication of Sertürner upon "morphium," which he noted was basic and called a "vegetable alkali," investigated cinchona for themselves and made the discovery of quinine in 1820.

Before discovering quinine, however, Pelletier and Caventou had made other discoveries in the field of plant chemistry which would have been sufficient to have made them famous even had quinine not been added to the list, for in 1818 they had discovered strychnine in nux vomica and separated carmine from cochineal, and in the following year had found brucine in nux vomica and veratrine in sabadilla seed. The name "alkaloid" was first proposed by W. Meissner, 1818, and was immediately adopted by Pelletier and Caventou, who used it in the paper describing the discovery of quinine in 1820.

Joseph Pelletier was the son of a French pharmacist, and had begun his work under Vauquelin, Director of the "Ecole de Pharmacie" in Paris, and later became a retail apothecary in Paris with a flair for drug research.

Joseph Bienaime Caventou was another Parisian pharmacist with a liking for plant chemistry. He was also the Pharmacist and Professor of Toxicology at the "Ecole de Pharmacie" in Paris and it was probably through their separate contacts with Vauquelin that they met, became friends and joint workers in the field which both loved and in which they must have had especial aptitude.

When they started their work together in 1818 Pelletier was but thirty-two years of age and Caventou was only twenty-five. As I said before, Pelletier and Caventou had worked jointly on other drugs before attempting the research upon cinchona. When they began this work they reviewed everything that had been done up to that time.

The work of Fourcroy, the investigations of Vauquelin, and particularly the process of Gomez, were considered in detail. It was the work of Gomez upon which they finally decided to center their efforts. They reviewed it in an exhaustive manner and planned some improvements in the method as they proposed to apply it.

They next proceeded to apply the improved method to yellow cinchona bark, and to their great astonishment could obtain no crystalline residue. Instead, they isolated an amorphous substance which was very bitter, and which, unlike cinchonine, dissolved completely in ether, and after many experiments they concluded that yellow bark yielded a different alkaloid from gray bark upon which Gomez had experimented. Here is the translation of their conclusions at this point:

> "As in a work of some extent we are obliged to designate the alkaloid of yellow cinchona without employing paraphrases; and as besides, this substance clearly characteristic deserves a special name as much as its relation of the gray cinchona, we have decided to name it quinine in order to distinguish it from cinchonine, by a name which immediately indicates its origin."

Thus was one of our remedial agents baptized in a paper entitled "Recherches chymiques sur les Quinquinas," in the Annales de chemie, 1820, page 289.

The authors then prepared and described a number of salts of the new alkaloid and afterward experimented with "red bark" and were rewarded with a far richer yield of alkaloid than any that they had previously obtained, for while the gray bark gave them 2 grammes of alkaloid to each kilogram of bark, and the yellow bark yielded 9 grammes of quinine to the same amount of bark from the red bark, they were able to obtain 8 grammes of real cinchonine and 17 grammes of the newly discovered quinine from each kilogram of the bark. They had also proved that the "cinchonino" was not a simple substance but was a mixture of two alkaloids, one of which they proved to be quinine, and the other of which retained the name "cinchonine."

In concluding their paper they pointed out that these alkaloids might serve as substitutes for the bark and expressed the hope that some skillful medical practitioner, "joining prudence to sagacity," would make therapeutic researches upon these products.

As to who was the first physician to use quinine there has been some controversy. It is certain, however, that two names stand out more prominently than others. One of these was Francois Magendie,

the pioneer character in the field of experimental physiology. As an early and ardent advocate and experimenter upon living animals, Magendie made for himself a reputation which persists to this day in the annals of anti-vivisectionists. He was the founder of the first journal devoted exclusively to physiology—the *Journal de physiologie experimentale.*

His name in medical history is associated with the study of the pharmacology of and introduction into medicine of iodine and the iodides, bromine and the bromides, morphine, strychnine, brucine, veratrine, emetine, and last but not least, quinine and cinchonine. Magendie's most popular work was called a "Formulary for the preparation and mode of employing several new remedies." This work went through numerous editions in its original tongue and in translation. The first American edition was translated from the third French edition by the celebrated Dr. Robley Dunglison in 1824, and was published by James Webster in Philadelphia.

In this work is given a résumé of the work of early investigators and a discussion of the composition and chemical properties in which references are made to the work of Gomez, Duncan, Pelletier and Caventou, on the isolation of the active principles; Brande on the composition, and Henry and Robiquet on methods of preparing the alkaloids. Robiquet is the same one who a few years before had investigated the composition of coffee in the hope of finding quinine, as both plants belong to the same botanical family, but was rewarded for his pains by the rediscovery of caffeine, which had been previously reported by Lochner in 1817 in Maté or Paraguay tea.

Magendie gives credit to a number of contemporary physicians including Double, Villermé, Chornel, Elliotson, and Dickson, who had found quinine to possess febrifuge properties. As an indication of the priority of Magendie's work he states: "As soon as these alkalies were discovered, M. Pelletier, one of the discoverers, sent to me a certain quantity that I might study their effects on certain animals." Later he refers to a colorless and transparent syrup of quinine which had been prepared for him by M. Pelletier himself and which Magendie speaks of using daily in his practice. Magendie also gives formulas for wine of quinine and tincture of quinine and for several preparations of cinchonine, with which he also experimented.

In Magendie's book is mentioned the names of two other workers, M. Laubert and M. Strauss, of Moscow, who, he says, published work paralleling that of Gomez and appearing almost simultaneously with

the work of that authority. No other writer on the history of quinine mentions these names, so far as I have found, and as Magendie gives no references, the statement could not be verified.

It is interesting to note in Magendie's work that the true composition of cinchonine had not been ascertained. Pelletier and Caventou are quoted in the shape of detailed analyses showing carbon, hydrogen, and oxygen, but no nitrogen, while Brande claimed the presence of carbon, hydrogen, and nitrogen, but no oxygen. Neither of these analyses were correct, as cinchonine contains the same elements as quinine, about whose composition there seems to have been no controversy.

Another physician, who is given a prominent place by medical historians as an early user of quinine, is Dr. F. C. Maillot, who was a medical officer in the military training hospital at Metz, and finally rose to be chief of staff and president of the Sanitary Board of the French Army. Maillot's reputation in this connection rests upon several treatises which he wrote while serving in Algiers and Ajaccio in 1832. These papers were upon the treatment of intermittent fevers with quinine. His work must have been convincing and constructive, for in 1881 a street in Algiers was named for him and in 1888 a village in the district was named for him and he was voted a pension of 6000 francs.

Pelletier and Caventou took out no patents for the discovery or manufacture of quinine, as would be done today, but in 1827 the French Institute of Science awarded to these two investigators jointly the Prix Monthyou, consisting of 10,000 francs, a small reward for such a service when compared with other rewards for similar services, and especially as contrasted with the bonus and pension granted by Louis XIV to the charlatan Talbor. Pelletier's interest in quinine must have continued for many years, for he not only became a large scale manufacturer of it, as will be seen later, but as late as 1831 he proposed a dentifrice composed of pulverized coral and quinine and colored pink with carmine. It is doubtful whether even radio broadcasting could popularize such a bitter dentifrice as that must have been. Pelletier must have been trying to make the world "quinine conscious."

The manufacture of quinine commenced in Europe immediately after its discovery. We do not know the exact date when Pelletier began the manufacture of the cinchona alkaloids commercially, but it must have been soon after the discovery, for in 1826 Pelletier and Levaillant (a new associate) manufactured nearly 6000 ounces of

cinchona alkaloids, and in that same year a Swiss apothecary named Riedel began the manufacture of quinine in Berlin, for which he obtained a price equivalent to about $8 an ounce.

The manufacture in America was begun in Philadelphia by Farr and Kunzi, the predecessors of Powers & Weightman, for in a masterly review of this phase of the subject, published by Joseph W. England in 1898 in the Alumni Report of the Philadelphia College of Pharmacy, it is stated that Farr and Kunzi supplied customers as early as 1823 with quinine sulphate at $16 per ounce. In 1824 George D. Rosengarten, the founder of the firm of Rosengarten & Sons, also commenced the manufacture of quinine sulphate in Philadelphia. Both of these firms are now merged with Merck & Company.

The price fluctuations and manufacturing vicissitudes and changes during the past century and more would constitute a special research in itself. We can only say briefly that the price has been as low as 20 cents an ounce, although in times of scarcity it has reached twenty times that figure on many occasions, and that the greatest manufacturing center for quinine in the world is now in Java, where the output in ounces annually is calculated in the millions.

Another interesting and valuable contribution to the commercial history of cinchona was made by Dr. George B. Wood of the American Journal of Pharmacy in 1831, in which he discusses at length the sources of the different botanical varieties of the plant and the routes by which supplies enter commerce and arrive at the point of distribution and use. This paper was published two years before the appearance of the first edition of the United States Dispensatory, of which Dr. Wood was one of the co-authors. According to Dr. Wood, all of the American supplies of cinchona were then coming through London, none being brought directly from South America, then the only source.

This reminds us that a history of the production and cultivation of the drug itself would be another romance. From the time in 1743 when La Condamine, the explorer, so tragically lost his cargo of seedlings at the mouth of the Amazon, down through the time of its introduction into Java, India and Ceylon, including the discovery of a method of increasing the yield of quinine two and even three fold; the niggardly pensions of a few pounds a year granted by the British Government to the intrepid explorers who succeeded in transplanting the tree into British Dominions, bringing revenues of millions and saving hundreds of thousands of lives; the almost unbelievable shabby

treatment of Charles Ledger, who did more than any other single individual to reduce the price of quinine and who was years later discovered living in poverty in New South Wales, after which he was awarded the handsome annuity of one hundred pounds per annum; all of these tributary phases of the history of quinine must be left undeveloped.

In rounding out this scene which concludes in the middle of the nineteenth century, we must chronicle the following relevant facts: Quinidine was isolated by Henry and Delondre from cinchona in 1833, and cinchonidine was found by Winckler in 1844. These alkaloids were really named some years later by Pasteur, who did a brilliant piece of work in proving the isomerism of quinine and quinidine, and of cinchonine and cinchonidine, and who prepared the artificial isomer of quinine which he named quinicine (which has toxic properties), and which was proved by Fusenegger to be identical with quinotoxine, previously reported as a by-product of cinchona alkaloid manufacture.

We are now up to the middle of the nineteenth century when the final scene of the drama begins. This again is serio-comic, almost melodramatic. There are not many star performers, so we shall simply describe the scene chronologically.

The efforts of manufacturers to supply the increasing demand for quinine were only partially successful. Processes for the preparation of the alkaloid quinine and its sulphate were introduced into the United States Pharmacopœia in 1840 with the hope that its preparation by retail pharmacists would aid in its supply and distribution. By the year 1850 quinine was in such demand and the price was continuing at such a high level (nearly a cent a grain) that the Society of Pharmacy of Paris made an offer of a prize of which the conditions, in part, were as follows:

> "It has long been an important question with pharmaceutists how to obtain a substitute for sulphate of quinia possessed of the same therapeutic effects, or how to reduce the price of its production so as to permit its employment in all the numerous cases in which its use is indicated. . . . They have therefore resolved to make an appeal to chemists on this subject in the hope that it will be duly responded to . . . Thus urea, to cite a common example, it is universally admitted, may be produced with C,H,O and N, and the time is not far distant, it is thought, when the general problem shall be solved, and any organic compound can be reproduced from the inorganic elements which compose it, either by imitating a synthetic process of nature, as yet unknown, or by the employment of means which the chemist already employs, as for

instance, the production of artificial urea . . . Influenced by these considerations the Society of Pharmacy of Paris propose a prize of 4000 francs for the chemist who shall discover the means of preparing quinia artificially, without employing in its preparation either cinchona bark or other organic matter containing quinia ready formed. In case this desideratum shall not be attained, the price will be awarded the author of the best work making known a new organic product, natural or artificial, having therapeutic properties equivalent to those of quinia, and which it will be possible to substitute for it in commerce."

The essays to be addressed to the secretary general of the society before the first of January, 1851, and each contestant was required to submit a specimen of at least 250 grammes made by his proposed method.

Now as far as accomplishing the desired result of discovering a method for making synthetic quinine was concerned, the offer was unproductive, for to this day no one has succeeded in preparing quinine synthetically, although a great deal is known about its structural composition. As evidence of the repercussions of this offer over a period of many years, I can quote the following instances:

In 1881 the *New York Commercial* announced that quinine had been made synthetically from coal tar. This must have been one example of a reporter's dream, of which we continue to have many at the present time, for no subsequent report was ever recorded concerning this alleged discovery.

In 1882 it was stated in the *Comptes Rendus,* with great particularity of detail, that:

"Mr. E. J. Maumené has succeeded in the synthesis of quinine by a simple and easy process, and he has deposited with the Academy a sealed package describing his process and containing a specimen of the artificial alkaloid. Therapeutic experiments with the artificial substance are still unfinished, but very soon the discoverer will publish detailed statements and evidences of his results."

The world is still waiting for these proofs, as it has so often waited for proofs of specific remedies for cancer, tuberculosis and other grave diseases. A few years later there was announced a method of making quinine from cupreine, sodium, methyl alcohol, and methyl bromide, heated together in an autoclave. This method did produce quinine, but as the starting point was cupreine, another one of the

cinchona alkaloids, it cannot be classed among the methods of synthesis.

As has been stated previously, the important alkaloids of cinchona may be paired off as isomers, *i. e.*, quinine and quinidine and cinchonine and cinchonidine. Now quinine and cinchonine show certain similarities of structure in that they both contain quinoline and piperidine rings. Quinine contains a methoxy group (which is missing in cinchonine) in the para position in the quinoline group. The later researches of Fraenkel show the piperidine ring to be the true pharmacophore and it is believed that the less certain action of cinchonine is due to the absence of the methoxy group which acts as an anchoring ring.

Now, already in 1850, when this prize offer was made, it was known that quinine had certain structural groups which were related to basic constituents obtainable from coal tar. And here we must recount one of the most interesting episodes in chemical history, for from the time of the ancient alchemists, beginning the search for the philosopher's stone more than a thousand years previously, who had accumulated as by-products of their search the facts out of which were to be developed the science and the art of chemistry, no more valuable discovery had ever been made than one by a youth of eighteen who was trying to win the prize offered for the discovery of a synthetic method of making quinine.

The name of the youth was W. H. Perkin. He was permitted to leave school at the age of thirteen and enter the Royal College of Chemistry in London as a student under the great Hoffmann in 1853. At the end of the second year so rapid was his progress and so great his aptitude, that he was allowed to commence an independent research and his first piece of work was the isolation of anthracene (then called paranaphthalene) from coal tar and its nitration. Upon the conclusion of this effort he became a member of the teaching staff of the college and began a new research which had for its object the synthetic preparation of quinine.

One of the first steps in his carefully planned work was the oxidation of aniline. The particular sample of aniline with which he began his work was not the pure substance he supposed it to be but was contaminated with a homologue called toluidine, and his oxidation product proved, fortuitously, to be a chemical compound of such high tinctorial power and beautiful color, whose value was so apparent that the original goal was forgotten, and the unlocking of the secrets of

the coal tar barrel began along new and unexpected lines. Perkin's purple, mauve, and aniline purple are some of the names of this now almost forgotten product which has been eclipsed by hundreds of competitors in the years that have passed, but the world will never recover from the effects of that youthful error, made possible by the assurance born of inexperience, for as stated previously, quinine has not yet been synthetically produced, although the potential rewards, apart from the fame itself, are almost as great today as they were then.

Until 1885 the chief antipyretic in use in medicine was quinine. Then appeared acetanilid, and in rapid succession, antipyrin, phenacetin, and later the salicylates, aspirin, and more recently, cinchophen. Of all these the only one related to quinine in molecular structure is cinchophen, but that does not possess any of the other valuable properties of quinine.

There have been many attempts to alter or modify quinine so as to improve upon it. One such product was euquinine, or quinine ethyl carbonate; another was aristochin, or carbonyl quinine. Up to the present time, however, no modification or derivative of quinine has been produced that is even nearly as good as quinine itself.

Frauds were attempted, too, in the field of quinine substitution. In 1896 there was exposed by Dr. W. A. Puckner, still of the staff of the chemical laboratory of the American Medical Association, a product marketed under the trade name of "Florachina," purporting to be pure quinine sulphate in tasteless form. This, upon investigation, was found to be a fluffy crystallized form of calcium sulphate, a most shocking type of fraud, considering that it was offered for sale in malarial districts in the South (it was made in Florida), where quinine was in great demand.

The most famous antiperiodic remedy of the nineteenth century was Warburg's Tincture. This preparation was originated and used in his practice by Dr. Carl Warburg, an Austrian physician. It became so famous and so popular with physicians that in 1848 the Austrian Minister of Health put it upon the list of medicines required to be stocked by all pharmacists, fixed the maximum price at which it might be sold to the public, and established a laboratory in Vienna for its manufacture (still as a preparation of secret composition), under the supervision of its originator, Dr. Warburg. Some years later a medical commission was appointed to examine the tincture and prepare a formula for it which might be given to the world. This commission reported and a formula was published which gave as the ingredients

aloes, zedoary, angelica, camphor, saffron, and quinine in an alcoholic menstruum. The publication of this formula, however, did not appreciably diminish the demand for the genuine article made under the supervision of its originator. In the meantime, the genuine Warburg's Tincture had acquired a great reputation in India, where one of the commissioners supplied it at his own expense to the medical officers.

Some few years later, Dr. W. B. MacLean, Inspector-General of the British Army, gave added testimony to its value in an article published in the *Lancet* and gave a formula for the tincture which he said had been confided to him by Dr. Warburg. This formula contained aloes, rhubarb, angelica, elecampane, fennel, saffron, prepared chalk, gentian, zedoary, cubeb, myrrh, camphor, agaric, and quinine, prepared with proof spirit. This evidently killed the sale of the genuine preparation, for a few years later Dr. MacLean found Dr. Warburg living in poverty in England and collected funds for his relief. Among the contributors to this fund was the India Office, which gave two hundred pounds. Dr. Warburg died in obscurity and comparative poverty over a quarter of a century ago and neither his name nor that of his tincture appear in Garrison's History of Medicine, so well do medical men conceal the professional family skeletons.

Warburg's Tincture is still official in the National Formulary and in some foreign pharmacopœias with the formula essentially as given by Dr. MacLean, and it is still prescribed by many physicians in spite of its polypharmacal empiric character.

The closing portions of this story are more familiar to you as medical men than to any other group, and are concerned with the scientific reasons for its effectiveness in malaria. The high lights in this section may be given as follows:

In 1879 Dr. Patrick Manson found the mosquito to be the host in filariasis.

In 1880 Laveran in Algeria observed parasites in the blood of persons suffering from malaria.

In 1883 Dr. A. F. A. King had suggested mosquitoes as a possible cause of malarial fever rather than bad air (*mal air*).

In 1885 the parasites of Laveran were described by Marchiafava and Celli.

In 1886 Surgeon General Sternberg of the United States Army directed the attention of the medical profession to the question of the

cause and cure of malaria and stimulated such investigators as Councilman, Abbott, Thayer, Osler, and others.

In 1894, Dr. Manson, previously referred to, formulated an hypothesis of the cause of malaria and enlisted the support of Dr. Ronald Ross, who verified the soundness of the hypothesis in the malarial districts of India. This research occupied nearly five years, and during this time the species of mosquito which acts as the carrier was identified by Bignami as *Anopheles*.

In 1900 Drs. Sambon and Low confirmed the work of Sir Ronald Ross in the malarial marshes outside of Rome.

In 1902 Sir Ronald Ross received the Nobel Prize for his work and the physiological action and therapeutic use of quinine was placed upon a sound scientific basis. Within ten years after the award of the Nobel Prize to Dr. Ross, the mortality from malaria had been reduced in Italy alone from 28,000 annually to less than 2000.

And so the curtain descends upon the drama which we have been constructing during the past hour. Characters which once were realities of flesh and blood are now but dim wraiths who have stepped from the yellowed pages of almost forgotten books. It is well for us to summon these ghosts from the past once in a while that we may learn anew and with greater emphasis that the wisdom of today is frequently the folly of tomorrow. Many individuals have appeared in this drama, but none of them stand out in such bold relief as Pelletier and Caventou, unselfish, working for the love of scientific discovery more than for fame and fortune, and with a scientific accuracy that was remarkable for the time. These two men, co-sharers in the honor of the discovery of quinine, compel our admiration.

Some few years ago the University of Oxford conferred a posthumous degree upon Roger Bacon, the Franciscan monk, nearly seven hundred years after his death. Might it not be well to suggest to the Nobel Prize Committee the propriety of awarding the Nobel Prize, posthumously, to Pelletier and Caventou, the inadequately rewarded discoverers of quinine, one of the most valuable drugs in the materia medica of the whole world, recognized in every pharmacopœia, used in every country and clime, prescribed by every physician, and dispensed by every pharmacist?

THE PHARMACY MEDICAL PROBLEM*

By Leonard A. Seltzer, Detroit, Mich.

FROM time to time problems of policy arise which have to be discussed and studied until a satisfactory solution is worked out or at least a step taken in the progress toward solution. After all, one cannot expect final solution of social problems. As times change, customs will change, and what satisfied the minds and standards of one period is seen, by those who come after, as a mere passing phase of growth and evolution. Nevertheless those steps, though temporary, are essential steps and we must not be deterred from taking them by the conviction that they will be left behind by our successors.

Among the oldest problems of policy which has been facing the practice of the art of healing is the relation between its coördinate branches, the practice of pharmacy and of medicine. There is perhaps no problem confronting us today of longer standing and of more vital import than the relation of these two branches of service. Considerable progress has been made and yet we muddle along as best we can under the present unsatisfactory conditions.

There are three parties to the problem: the public, the pharmacist, and the physician. Let us look at the matter from the point of view of each of these three parties.

Point of View of the Public

It is generally conceded that to the public both the pharmacist and the physician are a necessity. But some regard the pharmacist only as a necessity and the physician as a luxury; especially is this the case with a large portion of the foreign-born element. While on the other hand, if one were sufficiently interested he might devise a plan for taking care of the needs of the public by physicians exclusively—eliminating that phase of pharmacy recognized as the retail trade. He might argue that the public would get better care taken of their needs by physicians because of their better qualifications.

However, the number of competent physicians and their facilities to meet the demands is of course totally and hopelessly insufficient for any such program either now or at any time not too remote for consideration. The interests of the public demand that so far as necessary both pharmacists and physicians should continue their work.

*With Apologies to Dr. Walter B. Lancaster.

Some pharmacists are not unaware of their limitations. They know (or should) full well that the public in some cases needs the benefit of such competent investigation as it is in the province of a physician to give; they suspect it in other cases and they probably know that there are many cases in which the need exists although it is quite unsuspected by them or the patient. Appreciation of their deficiencies has led pharmacists to raise their standards in their own special field and require better preparation than heretofore, which preparation has had the inevitable tendency to stimulate them to function in their own field exclusively and to avoid functioning in that of others.

A hundred years ago dentistry was a part of the field of the practice of medicine and the setting up of a separate branch of limited practice by men without full medical training, *i. e.,* with a training limited to dentistry, was strenuously opposed by general physicians who declared that only those who had a full medical training should extract teeth. A *modus vivendi* has been established between dentists and physicians to the mutual advantage of themselves and the public. There have always been those who deplore progress toward specialization, nevertheless the wheels of evolution roll on inexorably.

Point of View of Physicians

Some physicians think that they have exclusive rights. All deplore the sad results of errors and oversights of pharmacists just as they do those of physicians. In either case the public suffers. To give the pharmacist training that would make him as fully competent as the physician would be to eliminate the latter by making a physician out of the pharmacist. What is the remedy? How was the dental problem solved? Can we discover any evolutionary principles applicable to our case? At the present time cordial co-operation exists between physicians and dentists to the great advantage of both parties and the public. Co-operation between physicians and pharmacists would, if engaged in, likewise redound to the benefit of the public and to both professions. If pharmacists would refer cases to physicians for diagnosis with the same sort of friendly spirit of confidence and of co-operation that exists between medical consultants, what a fine public service would be consummated! What stands in the way? The great obstacle to co-operation between pharmacists and physicians is *commercialism.* The practice of some pharmacists as well as that of some physicians is too much a matter of short-sighted business. *A professional spirit must be developed.* The essential basis of a profession is *professional*

spirit. This may be defined as the ethical attitude of the members of the profession or between members of different professions toward one another and toward the public. It is exemplified in the medical profession by the Hippocratic oath or pledge. For centuries the best men in both professions have stood by these high standards. Many a time have members fallen short of these standards, but ever above the muck of selfishness, greed, commercialism, and lust, the banner of high ideals has been carried by those whom we love to call leaders. All our customs and traditions in the matter of consultation have grown up around these standards. There is not the slightest chance of any official recognition of any lower standards. Anyone who lacks these high standards, who, perhaps in his secret soul, calls them "bunk," knows nevertheless that if he wishes to attain eminence he must at least simulate the possession of these principles, he must talk and act as if he were actuated by them. This is the strongest sort of proof of their validity.

Point of View of Pharmacists

Not a hundred years ago nor a thousand, but from the very beginning, the practice of Pharmacy was associated not as a branch of medicine but as an activity coördinate with that of the practice of medicine, in the art of healing. The cleavage took place when and as the underlying sciences developed to the point at which the *application* of medicine on the one hand, and the *preparation* of it on the other, demanded the attention of two separate lines of endeavor. Now, if the segregation of dentistry and its coming to a perfect understanding with the medical profession has been so beneficial to all concerned, and if the proposed establishment of like relations between the optometrist and physician be a consummation so devoutly to be wished, how much more would a similar understanding be desired involving the abandonment of a policy based on short-sighted self-interest, between medicine and pharmacy, the latter a profession long recognized, and one with traditions and ethical standards well developed and established. If the understanding would involve not merely that pharmacists refer cases to physicians for diagnosis and treatment, but also the practice on the part of the physician of returning to the pharmacist the case referred by him to the physician with the opportunity of preparing the patient's medicine for him, we repeat, what a fine public service would be consummated! There are of course and always will be in both professions persons who will ignore their responsibilities in

the matter; on the other hand the leaders in both professions recognize the much greater significance both from the standpoint of breadth of scope and vital interest of the relationship between pharmacy and medicine, than that of the relationship between medicine and either of the two professions mentioned above, affecting as it does not merely a limited specialty, but the entire range of medical practice. They recognize also how much greater and more vital is the benefit to themselves and to the public if a cordial co-operation between the two professions exists, and the importance of working for the advancement of such co-operation.

Organized pharmacy has long striven for high professional standards and achieved them with a marked degree of success. These standards are maintained by a considerable group, and as is the case with physicians, any pharmacist who wishes to attain any recognition must act and talk as if he accepted these ideals, or must at least simulate the acceptance of them.

If, when, and as these standards which are already accepted by organized pharmacy and maintained in practice by a considerable group, which is constantly growing, and when and as the recognition of this fact by physicians becomes more general, then cooperation between the professions will be an accomplished fact.

CO-OPERATION BETWEEN PHYSICIAN AND PHARMACIST*

By Charles H. LaWall, Sc. D., Ph. M.

Dean of the Philadelphia College of Pharmacy and Science

I HAVE been asked to speak to you for fifteen or twenty minutes upon a subject which is very close to my heart—the co-operation between physician and pharmacist. I am using the group names in the singular instead of in the plural form because co-operation is singular instead of being universal and automatic, as it should be.

In fifteen or twenty minutes I can give you only a synopsis of my views on the subject, and as to how much of a permanent impression I can make upon you is doubtful, for a prominent psychologist has said of such talks that half is forgotten after the first half hour, two-thirds in nine hours, three-quarters after six days, and four-fifths after a month. As I wish to impress much of what I am going to say upon you permanently, I would like you to imagine that I have talked for an hour and a half and count what I say as the 20 per cent. that is to be remembered permanently.

Within the past week each of you has received a circular from your own national association, which has this pertinent question in bold-faced type at the top: ARE DOCTORS NECESSARY? If you are willing to answer "No!" to this question, I will consider any time that I may spend in talking to you as wasted, and will stop before I begin, but if, as I expect, the answer is unanimously "Yes!" then let me ask another question: ARE PHARMACISTS NECESSARY? and proceed to answer it. I wish we could agree upon this statement as being axiomatic, in which case we could shake hands in a friendly way, pat each other upon the back, and go home early.

The fact is that there are more pharmacists willing to subscribe to the first statement than there are physicians willing to agree to the second, and I will claim, without fear of contradictory proof, that there are a score of individual instances of dispensing by physicians to every single case of prescribing by pharmacists.

The trouble begins in the medical colleges. Prescription writing is taught in the early part of the curriculum and materia medica and therapeutics are treated as minor subjects in most medical schools, with

*Read at the meeting of the Philadelphia County Medical Society, Wednesday evening, December 9th.

the result that the embryonic medico, just out of college and ready to begin his interneship, is not really sure as to whether ammonium bromide is a solid, a liquid, or a gas, and is unable to sit down and write a creditable and accurate prescription. After he has served his interneship he will have memorized certain routine prescriptions, which for the most part are made up in bulk and dispensed without any more regard for the individual needs of the patient than nostrums sold in package form for similar general purposes.

Upon entering into practice on his own account, with a training and experience such as has been outlined above, it is little wonder that he either falls an easy prey to the detail man who convinces him of the value of a ready-made specialty or to the salesman for a physicians' supply house who stocks him up with a lot of pills, tablets, etc., so that eventually he develops into a practitioner who almost never writes an individual prescription unless it is for a ready-made specialty.

During the greater part of his active professional life the United States Pharmacopœia, the National Formulary, and that valuable epitome of both, called "Useful Drugs," which is issued by the American Medical Association, constitute a *terra incognita,* so far as he is concerned. In the meantime the modern graduate of pharmacy, who has spent three or four years in mastering the scientific and technical details of his profession, is in the position of being "all dressed up with no place to go," for many prescriptions which come to him require no greater professional skill than is needed to change the label on the bottle of a liquid specialty, or to count out a dozen pills or tablets from a stock bottle, and affix the proper label with directions for use.

If you are satisfied that medicine should be practiced in that manner then I have no arguments to make and no criticism to offer. But let me first quote from one of the leaders in medicine and see whether you do not rather agree with his views:

> "One of our first duties to our medical students is to impress on them by word and by example the importance of the individuality of the patient; to show them that since no two individuals are alike, no two cases of the same disease can be just alike; and so none should receive standardized treatment. Human beings cannot be treated like homogeneous steel and wood. Good medicine and good surgery demand the careful study of the patients' physical, psychical, and social problems. To perform exactly the same operation on two cases of appendicitis, to prescribe exactly the same medicine for two patients with pneumonia, means that one, and probably both of the patients, is not getting the best of care.

Exactly similar suits of clothes will not fit well two different men, and the better the tailor the more alterations will be made until each suit does fit its owner exactly. So a good therapeutist will not write exactly the same prescription for any two patients. He will find differences between them which influence his treatments. Fine organization with a view to mass production may succeed in the business world, but good medicine demands individual attention; retail business; bench work. To teach this to our students is our duty. It is a hard task, for by so doing we are going contrary to the ideals of the business world of today." (Charles P. Emerson, M. D., in "Problems in Medical Education.")

We might add to this that mass production has not proved the great benefit to business that was expected, for mass production usually means overproduction, and overproduction means economic trouble sooner or later. Let me quote again from a medical authority in support of my position both as to physicians and pharmacists:

"The modern pharmacist must be a well-educated man with special knowledge of chemistry and biology, as well as of the compounding of drugs and their preparations. The armamentarium of therapeusis includes substances so potent that dosages are measured in millionths of grams or cubic centimetres, and products so delicate that their preservation demands large and costly equipment.

"The physician thoroughly trained in therapeutics must depend on the pharmacist to provide what he desires for the patients promptly and efficiently.

"It has been urged that the development of the package medicine has made prescribing a lost art. If this be true, it is exceedingly unfortunate for the public, since the competent therapeutist is able to render relief to the patient and indeed to promote the cure of his disease in a manner that arouses amazement in the medical hack who has learned to depend on fixed substances as the basis of his prescribing.

"The old-time practitioner used to inquire symptom after symptom and put something in the prescription to cover every indication. The modern practitioner makes a careful diagnosis and is able to employ potent remedies that attack the cause of the ailment, as well as to prescribe effective preparations for the relief of uncomfortable symptoms.

"The pharmacopœia of ancient days included every preparation that any physician might want to prescribe, regardless of proof of its potency or virtue. The modern pharmacopœia is a carefully selected list of preparations of dependable composition, and, in the majority of instances, of dependable action. For those physicians who still depend on empirical proof of therapeutic

virtue, the National Formulary provides a vast number of time-tried preparations. For the newer drugs of established composition and therapeutic claims, 'New and Non-Official Remedies,' prepared by the Council on Pharmacy and Chemistry of the American Medical Association, is a reliable guide.

"No doubt the most useful of all the available references for the physician who wants to make his therapeutics sound and efficient, is the little book called 'Useful Drugs.' From the tremendous amount of material available in the Pharmacopœia, the National Formulary, and New and Non-Official Remedies, a body of experts has selected some 250 drugs and preparations with which it is possible to practice efficiently.

"It is important that both the pharmacist and the physician be thoroughly familiar at least with this material. The promotion of scientific prescribing and dispensing will increase confidence in medicine and in pharmacy and is unquestionably the best method of attacking pseudo-scientific and fanatical cultists who oppose medical progress." ("Co-operation Between Physician and Pharmacist," by Dr. Morris Fishbein, in the *Chicago Retail Drug Association News.*)

There are certain angles of this situation which we pharmacists know and fear, and which medical men frequently overlook. When a medical man prescribes a specialty which is dispensed in the original container with the original label, or the name of the specialty blown in the bottle, the chances are that he is promoting self-medication and the use of this specialty for conditions where it is not indicated and for self-diagnosed ailments. There is little doubt that aspirin attained its great popularity in just this manner. Are you aware of the fact that there is an organized effort on the part of certain manufacturers to supply original individual packages of specialties to the hospitals instead of supplying these same specialties in bulk? The reason, as frankly claimed, is that the patient may learn the identity of the medicine prescribed for him and proclaim its virtues to others.

Are you aware also that many of the expensive specialties, in the field of organic chemicals, have their identical counterparts in the U. S. P. in non-proprietary form, and that a recent survey of the economic situation in this respect revealed the fact that taking ten of the most widely used products, as an example, in the proprietary form under the protected names, one ounce of each of these items cost in the aggregate $16.15, while one ounce each of the identical products purchased under the U. S. P. chemical names cost in the aggregate $3.74?

If you are impressed with the mounting costs of medical care as disclosed by the surveys which have been made of this subject, the economic protection of your patient demands that wherever possible you prescribe official drugs and preparations instead of the more expensive preparations.

When we find a condition confronting us we usually seek a remedy. In the condition outlined the remedy is obvious but impracticable. One cannot force the members of the medical profession to change their prescribing habits over night, and yet I venture to say that this same carelessness in prescribing has had a great influence in the encouragement and the spread of the cults and in the development and sale of some of the most widely used nostrums of the day.

The prescriptions should be viewed as the final and culminating step in the treatment of a condition that has been correctly diagnosed after competent and thorough preliminary study of the patient. If the patient treats the prescription lightly it is an evidence of loss of faith in the physician. The pharmacist possesses knowledge, concerning the forms in which drugs may be administered to greatest advantage, which the physician has always lacked and will never have the time properly to acquire.

To those physicians who have established such close, friendly, co-operative relations with a pharmacist, what I have said will seem commonplace; the unfortunate part of it is that so few physicians know this and take advantage of their opportunities. If I may be so bold as to suggest certain recommendations with regard to the situation, I would propose the following:

1. Let every physician aid in improving the status and importance of the pharmacy in the hospitals with which he may be connected.

There are many hospitals in the larger cities where the pharmacy is a credit to the institution and an important factor in its scientific progress. There are others in which the pharmacy is either lacking or is under the domination of a superintendent or a nurse with the mistaken idea of the importance of the pharmacist. One of my students who worked in such a hospital in this city received a prescription for quinidine in capsules. Having none in stock, he appealed to the superintendent, whose answer was "Just use quinine; the effect is the same." "What did you do?" I asked. "I went out to a drugstore in the neighborhood and purchased enough quinidine out of my own pocket to fill the prescription," was the reply. In some hospitals the pharmacist might have followed the instructions of the superintendent, and the

physician might have wondered why the quinidine did not help the case of fibrillation that he was treating.

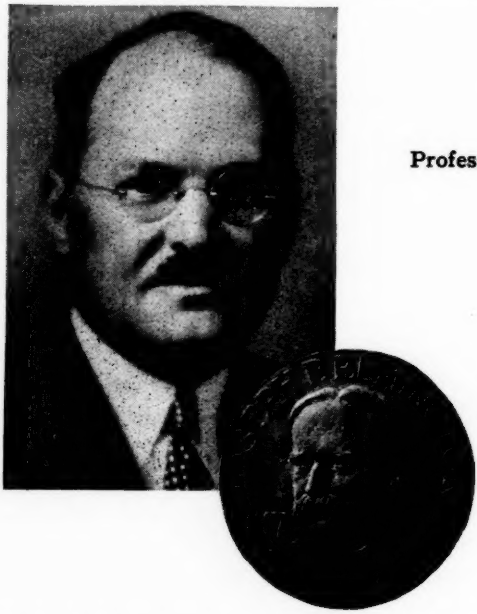
2. Let every organized medical society unite in an effort to reform the medical educational curriculum so as to provide for the teaching of prescription writing and therapeutics during the latter part of the medical course, where they properly belong.

The late Dr. Henry Leffmann used to enjoy telling a story of the medical specialist who employed every diagnostic aid known to science and then prescribed a nostrum of secret composition.

3. Let every organized medical society unite in an effort to change the admission regulations so as to permit the recognition by medical colleges of the four-year bachelor of science degree in pharmacy as a prerequisite course for entrance to medicine, for this course now contains all the necessary credits for pre-medical work as qualifying the possessor for entrance into a medical college, and is not recognized because of purely technical objections based upon archaic and unintelligent procedures.

If these recommendations could be made effective the influence which medicine and pharmacy would have as the result of interlocking of effort would raise the health standards of the public and increase its confidence in the profession of medicine.

THE REMINGTON MEDAL AWARD FOR 1931



Professor E. Fullerton Cook, Medalist

The Medal

THE REMINGTON Honor Medal for 1931 was awarded to Prof. E. Fullerton Cook, of the Philadelphia College of Pharmacy, at a testimonial dinner in honor of the recipient at the Hotel Pennsylvania, November 16, 1931. The New York Branch of the American Pharmaceutical Association awards this medal annually to the man or woman who has done most for American pharmacy during the preceding year, or whose efforts for a period of years have reached the point in the preceding year where they constitute the most important contribution to American pharmacy. For the occasion of the 1931 award, it was decided to request the co-operation of the Philadelphia Branch and to hold the testimonial dinner in the city of Philadelphia, particularly in view of the fact that the recipient was a pupil and an associate of the late Professor Remington, in whose honor the medal is named.

About one hundred and seventy friends and admirers of Professor Cook took part in the testimonial dinner. About one-fourth of these came over from New York; several came from Baltimore, Washington, Pittsburgh and other cities.

President James C. Munch, of the Philadelphia Branch, welcomed the visitors and introduced President Robert P. Fischelis, of the New York Branch, as the toastmaster. Dr. Fischelis gave a brief account of the history of the Remington Medal award, and spoke of the work of Professor Cook which had led to his selection by the committee of ex-presidents of the American Pharmaceutical Association for the honor that was about to be conferred upon him. He then introduced Dean Charles H. LaWall, of the Philadelphia College of Pharmacy and Science, who spoke interestingly on the topic, "Professor Cook as a Friend and Co-Worker." In the years of intimate association with Professor Cook, Dean LaWall stated that he had found him to be always loyal to the ideals of Professor Remington and to his associates at the Philadelphia College of Pharmacy. He commented on Professor Cook's great capacity for work and upon the splendid manner in which he had assumed the responsibilities for the production of the U. S. Pharmacopœia, following the demise of Professor Remington.

The second speaker was Dean H. V. Arny, of the College of Pharmacy of Columbia University, who spoke on the subject, "Professor Cook, the Pharmacopœia Maker." Dean Arny recounted in an interesting manner the many trials through which Professor Cook had successfully steered the "Pharmacopœial ship." He expressed the thought that Professor Cook had very successfully taken up the work of harmonizing divergent views among members of the Revision Committee in the interests of producing a work which had earned the designation of "peer among pharmacopœias of the world."

According to the rules of the Remington Medal award, as adopted by the New York Branch of the American Pharmaceutical Association when the medal award originated, the senior past president of the New York Branch presents the medal. Dean Jacob Diner, who is the present senior past president of the branch, was unable to be present on this occasion, so the honor of making the presentation fell to Prof. Otto Raubenheimer, who arose to the occasion splendidly. In a few well-chosen phrases he summarized the activities of the recipient which had earned for him the designation of "Remington Medalist for 1931," and those present arose and applauded as he presented the medal to Professor Cook. The recipient, after expressing his thanks for the award, read a prepared address in which he recounted the accomplishments of Professor Remington, and gave an interesting description of Remington's personality and ideals.

At the conclusion of Professor Cook's address, opportunity was given to those in attendance to congratulate the recipient of the medal and to exchange greetings. The arrangements were handled in splendid fashion by a committee headed by Dr. Herbert C. Kassner, secretary of the New York Branch, and Prof. William J. Stoneback, secretary of the Philadelphia Branch. Among those present was Mr. Percy Remington, a son of Prof. J. P. Remington, in whose honor the medal is named. Professor Cook's address follows.

The award of the Remington Medal brings vividly to mind the personality and accomplishments of Remington himself. That such a medal should have been established and regularly presented for more than a decade is a recognition of qualities of mind and spirit which have inspired many who counted him their friend and which, in review, should offer stimulation and an ideal to many young men who were not privileged to know him personally.

Through his boyhood he lived in an atmosphere of implicit faith in Divine guidance as touching every activity of life. He was taught and guided in principles of honor, honesty and morality by a loving mother of rare test; his daily contact was with a spirit of humanitarian service which his physician father practiced, and yet he was early in life thrown upon his own resources and subjected to conditions which developed self-reliance and character.

Throughout his life he retained this simplicity of faith and before making momentous decisions always placed himself in a reflective mood and, as he expressed it, "listened for the voice."

His brothers and sisters had been sent to the Friends' School at Westtown, but after his father's death economy was necessary and he entered the Central High and was always proud of his graduation from that justly famous school.

Remington knew his own mind and it was his decision that he would study pharmacy. He was fascinated by chemistry and the sciences when in high school and had a practical and inventive mind and pharmacy made a strong appeal.

Now came a series of new impressions to stimulate and mould his character and life. Was it a mere coincidence that this Quaker boy, quiet, modest and without special influence, should have associated during the next few years with the most forceful personalities in the American pharmacy of his generation, yes, of this century?

His first drug store experience was an apprenticeship with Charles Ellis, the head of a firm of wholesale manufacturing and retail drug-

gists and also at that time the president of the Philadelphia College of Pharmacy. Here he came into friendly and helpful contact with Mr. Ellis. Often, when in a reminiscent mood, Remington told of his observations and experiences during these four years of apprenticeship. Mr. Ellis, a Friend, always wore "plain clothes," and although the business was largely wholesale, Mr. Ellis frequently was present in the retail store and personally met many customers.

One story Remington often told, to illustrate quick thinking and wit, pictured the retail section of the Ellis pharmacy with Mr. Ellis hurrying to the front to meet several Quaker lady customers; he described and illustrated his manner and greeting, dignified but cordial, and then his showing them a beautiful sample of gum arabic just received, which he displayed on dark blue paper, when suddenly from the trap-door overhead a shout, "Look out below; here comes the precipitated chalk," and a mass of native English chalk, several hundred pounds in weight, comes tearing through the hole in the ceiling, smashes into a pyramid on the floor, and scatters like a thousand comets in every direction. One of the boys had placed a rope around a lump of chalk just imported and hauled it through the series of trap doors toward an upper floor and on the way it had crumpled and smashed to the floor of the store. The rules had been broken, for the platform with rope at the corners should have been used, but fortunately no one was hurt and Mr. Ellis forgave the culprit.

Many preparations were made in the laboratory and a first-hand knowledge of crude drugs and milling and manufacturing was the opportunity offered. One of the few youthful pictures of Remington was taken from the street in front of the Ellis store, with young Remington standing at a second-story window, resting his hand on a large spatula. He used to relate that he had just come from working at a crude plaster machine, which in later years was at the college. The hot plaster was poured into a hopper about fifteen inches long and was then pressed through a slit at the bottom on to muslin or cloth pulled along beneath.

The next step in his growth must have been definitely planned and with a keen appreciation of its opportunities, for in 1867, now a graduate of the Philadelphia College of Pharmacy and with four years of unusual practical experience, Joseph Remington entered the employ of Dr. E. R. Squibb, who enjoyed at that time a nation-wide reputation as a manufacturer of pharmaceuticals and chemicals.

In later years he kept in the closet of the workshop at Longport a little leather bag, about ten inches square, attached to a long strap, which he prized because it had carried his personal belongings when he made that first trip to Brooklyn.

He often talked of this period and considered it one of the greatest and most influential experiences of his life. Dr. Squibb must have looked upon Joseph and loved him for his many splendid qualities, for he took him into his home as a son, walked with him to and from the laboratory daily, discussed with him his experiments and processes and stimulated his love for the science underlying pharmacy. But more than this, Dr. Squibb left a tremendous impression upon his young mind concerning the all-importance of truth and honesty, principles of conduct which governed every act of Dr. Squibb. Remington loved to tell an incident in illustration of the inflexible character of this famous man. Together they were inspecting some laboratory operations when Dr. Squibb discovered that a trusted workman had unintentionally used an incorrect percentage of alcohol in the menstruum for a fluid extract of cinchona. The amount was relatively large, something like a barrel, and cinchona in those days was costly. However, without a moment's hesitation, Dr. Squibb ordered the man to pour it all into the sewer.

Afterward young Remington protested and suggested that they could have recovered the alkaloids, but Dr. Squibb replied: "Joseph, the influence on that man is worth the cost; he will never again make a mistake."

Remington often spoke of the mental struggle he experienced in deciding to leave Dr. Squibb. He reveled in the spirit of the man and in his scientific achievements and always regretted that he had not been able to continue in this field, giving his time and energy to research. He often resented the pressure of many executive duties which kept him from his beloved laboratory; but he accepted these as uncontrollable, and as his job, and put into every activity his best thought and service.

His future steps were not blindly followed. It was with Dr. Squibb's approval that he returned to Philadelphia and placed himself in line for teaching. Determined to obtain the broadest foundation, he arranged for a position at the chemical plant of Powers & Weightman, where again his personality and ability won for him an intimate contact with those outstanding men of the period. One incident of this time dealt with a business principle and was impressed upon him by

Mr. Powers. He often told it with a recognition of its amusing features.

One of the retail accounts was overdue and repeated billing had no response. The amount was not large, something like $28.02, and Mr. Powers called young Remington in one day and told him to go to the pharmacy and collect the bill. Remington said he went with some hesitation, but to his delight the customer paid the bill, at least paid him $28. He returned to the plant, and, with an evident sense of pride, handed the money to Mr. Powers. Mr. Powers counted the money, looked at the bill, again counted the money, and then said, "But I only find $28; how about the 2 cents?" Remington replied that he supposed that it would be all right to get the $28 and forget the 2 cents, and even offered to pay this himself, but Mr. Powers said, "Joseph, Mr. ——— owes us that 2 cents just as much as the $28 and he must pay it. Now go back and get the balance."

While still working with Powers & Weightman during the day, he became associated with Prof. Edward Parrish, who was then (in 1871) Professor of Pharmacy at the college. Many here know of Professor Parrish, at least by reputation, for "Parrish's Pharmacy" was the one textbook in pharmacy in America for many years and Professor Parrish himself was a man of culture and education and of exceptional ability. Remington often spoke of him and always with the greatest respect and affection. One feature with which he was especially impressed was his capacity as a lecturer, and I have heard Remington say that the College of Pharmacy never knew a more polished or accomplished speaker than Professor Parrish.

But Remington had definitely in mind, as his goal, the Professorship in Pharmacy at the college, and realizing that a prerequisite was a retail drug store contact, he opened his own drug store, in 1872, at Thirteenth and Walnut Streets, Philadelphia, a corner opposite the large and exclusive Philadelphia Club and in what was then an excellent section in the neighborhood of many physicians' offices.

In this same year Professor Parrish died, and Professor Procter, although he had retired from active teaching, again took up his teaching and kept young Remington as his assistant. This contact must have made its impress upon him, for even then Procter's place as the "Father of American Pharmacy" was established, but the one memory which came to the fore in later years was the indefatigable energy of Procter in his own drug store in experimenting continuously with drug extraction.

Two years later Professor Procter died, and, as opportunity beckoned, Remington with his remarkable preparation was ready to respond.

I have often heard him say that a young man must not be impatient, for it usually requires about ten years of hard work and preparation to be ready for worth-while things. This coincided with his own life record, for his apprenticeship in pharmacy began in 1863, and, after a rich experience, he is elected to a full Professorship in 1874. Again about ten years went by, full of activity in varied fields of pharmacy. He was chairman of the Committee on Pharmacy for the Centennial Exhibition of 1876, established the Operative Pharmacy laboratory at the college, helped to found the Pennsylvania Pharmaceutical Association, became in 1879 an associated editor of the U. S. Dispensatory, was a member of the 1880 Pharmacopœial Convention and elected to the Revision Committee and actively participated in the meetings and affairs of the A. Ph. A. By the close of this second ten-year period he was ready to write his textbook, "The Remington's Practice of Pharmacy," which, probably more than any other one activity, gave him nation-wide and international recognition.

An incident of this period illustrates the standard of accomplishment which Remington strove to reach in every undertaking. He had just completed the "Pharmacy" text and had so exactingly checked every statement and figure that he was positive no errors would be discovered. In a few days, however, someone pointed out several typographical mistakes, and in disappointment and chagrin Remington took to his bed, actually physically sick. Mr. J. B. Lippincott, Sr., had taken great interest in the young author and heard how Remington was feeling, and to cheer him up sent a note in which he stated that he, Remington, should not be so downcast, that his was the common experience of all authors, that even Webster's first dictionary went to press without including the word "dictionary." However, this did not lessen his vigilance and care and nothing gave him greater annoyance than to discover an error in his own work or in that for which he was responsible.

The master passion of his life, however, was his pride in pharmacy and his confidence in its future. He gave to its development all of his own great powers and co-operated with every sane movement of his day which promised the advancement of the art and science he loved. He clearly foresaw that pharmaceutical education must advance with medicine if pharmacy was not to lose its place as an associated

medical specialty, and in 1895 he took the initiative in advancing the courses of pharmacy in his own Alma Mater so that at that time they paralleled the scope and hours being required for the majority of medical students in the United States.

These glimpses of Remington the pharmacist and Remington the man are due his memory and they should be an inspiration to younger men in pharmacy. They are offered in remembrance of the years of close association and inspiration, in his company. He was exacting in his demands upon his associates, but he also won and held their loyalty and affection. He gave liberal recognition to their part in joint projects and continuously urged upon them, as a duty and opportunity, participation in association and college activities for the advancement of the profession.

There is no intention that I should here present a biography of Professor Remington; I have had in mind only a review of the remarkable combination of circumstances which influenced the character and personality of the man whom we rightly honor tonight through the perpetuation of his memory, and the recollection of the sterling qualities which he possessed.

As he advanced in experience and in years he received new opportunities continuously and many new honors came to him at home and abroad. Where pharmacy's problems were discussed, he was called into conference for more than a quarter of a century and increasingly regarded as the friend and wise counsellor of every group in pharmacy. This high regard was mutual, for he inspired confidence and genuine affection by his fairness and tact and by his skill in leading his associates into a course of action which reflected credit upon all.

But this brings my thought squarely up to the pharmaceutical situation in 1931 and it leads me to wonder how Remington would have reacted to today's problems. Pharmacy has always had a broad application. Hundreds of years ago it linked the primitive gatherers of herbs and roots in jungle, desert or mountain with the medieval mystic searching for the Elixir of Life or the Philosopher's Stone. As the medical sciences have developed, pharmacy has always been associated in the gathering, experimenting, preparing and dispensing of medicines and therapeutic aids to treatment. Today pharmacy serves as a bond between the most intricate researches of the medical sciences and the practical application of these to medical use. This is still the major field of pharmacy and there is no limit to the opportunities presented.

To the unprecedented developments of the last half century the medical sciences have contributed their share, and the intense activities of chemists, physicists and bacteriologists in health promotion are reflected in both medicine and pharmacy. In this constant search for facts we naturally see two trends. One of these is the discrediting and disuse of some of the older remedies and methods. The other is the discovery and introduction of the new. This situation is revolutionizing pharmaceutical service in every one of its phases, but it is not destroying pharmacy itself, for many with ability and understanding have foreseen and are meeting the developments as they arise.

It is fully realized that the pharmacist graduating today must be thoroughly grounded in the principles and facts underlying pharmacy and then must specialize either in the sciences or in business, as personal plans for the future may demand. Pharmacy colleges are now equipping and organizing to take their part creditably in this advancing program.

Pharmacy is not worthy of survival as a profession if it cannot recognize and honestly face the new situations of this progressive and searching age. True, it is disturbing to be jostled out of one's complacency and discover that entirely new circumstances must be met. Are they, however, less interesting, or are the service opportunities less definite than in the past and is there not an adequate reward?

To stand still is to perish; pharmacy must awake or the opportunities will go to others more progressive and with a clearer vision.

What are some of the new conditions?

The manufacturing of chemicals and intricate pharmaceutical products are of necessity in the hands of large and modernly equipped organizations. Pharmacists rightly find abundant and profitable opportunity in these organizations. As technical experts in the many pharmaceutical operations, as analytical and research chemists, as managers, officers, and frequently as owners, as salesmen, advertising experts, and as "detail men," they are the backbone and brains of these organizations, great and small.

No training in the sciences can be too advanced for the pharmacist who would make his place in these business and professional groups. No one can deny that here is scientific pharmacy as never dreamed of in any previous period and with a fascination and a future so large that it has only been touched.

Think of the developments of the past few years: insulin, liver extract, biologicals, the vitamins, arsphenamin, the barbital group, local

anesthetics, new antiseptics . . . the number is legion and some of these new substances are notable contributions to the maintenance of health and the cure of disease. The medical sciences are absolutely dependent today upon pharmacy's contributions to medical practice and there is no danger that this need will lessen, for the field is expanding and the opportunities are only restricted by the limitations of the pharmacists entering this phase of practice.

As one reviews even the past twenty-five years it is difficult to believe that so great an advancement has been made in so short a time. In this period two legislature measures have brought about a revolutionary change in the programs and established policies of the nation in the matter of truth and recognized responsibility.

The Harrison Act controlling the sale and distribution of narcotics and the Food and Drugs Act requiring a true statement of fact concerning foods and drugs, have to their credit been incorporated as the foundation policy of all great pharmaceutical organizations and insure their perpetuation and success. Let it not be forgotten that both of these measures were promoted and made law largely through the initiative of pharmacists.

The activity of governmental enforcement officials turned in the beginning, about twenty-five years ago, much more energetically toward the food situation, as there was the greatest need. In this field today the results are phenomenal, for co-operation is the policy of the large food distributors and almost universal compliance with food regulations is the result.

In the medical field the problems are far more difficult than when dealing with foods, but tremendous advances have been made and the policy of most producers today is entirely in harmony with the declared principles of the Food and Drugs Act.

It is believed that more and more the wise business heads, working with the professionally trained scientific groups responsible for the creation and production of medicinal products, will recognize the wisdom of a policy which avoids a constant clash with enforcement officials and will expand the program, so ably begun by the "Contact Committee," whereby the manufacturer, who is honestly trying to maintain the ethical ideals of his profession, co-operates with the officials of the Government in a solution of the scientific questions involved, in the interpretation of terms and in the development of methods of analysis, fair to all.

But the retail pharmacist—what is his future?

Dispensing doctors, group practice among physicians, the clinic, the hospital, the expansion of drugless therapy, the abandonment of therapeutic teaching in many medical colleges, the growth of specialties, the chain store, cut prices, etc. These are problems enough to discourage the most optimistic among the older professional pharmacists. There is no panacea for these ills; pharmacy or no one group is responsible for this appalling array of problems facing the retail pharmacist of today.

Each difficulty, however, has its solution, and leadership in pharmacy is arising, ready to grapple with each problem in turn and furnish the answer. The dispensing doctor is largely an economic development. The Committee on the Cost of Medical Care intimate that up to a certain point this is justified but beyond it, the doctor must turn for help to the skilled dispensing pharmacist.

Certain it is that this development has given many pharmacists an opportunity to manufacture the products used and to detail and sell them to the doctor, and if the retail druggist is alert to his opportunities he may often be the one to supply the doctors of his neighborhood with the drugs they dispense. Retailers often overlook this opportunity. Often it is the chance to do some manufacturing. Here especially the retailer has the advantage if he uses it, of supplying doctors with products which are free from the danger of subsequent proprietary exploitation, after the doctors have sufficiently introduced them. Physicians are becoming increasingly conscious of the use to which they have been put in this respect in the past.

"Group Practice" offers real scientific opportunity to highly trained pharmacists. Every such group needs a well-equipped professional pharmacy as a unit in the organization. Here is no loss to pharmacy but a new field for development. The pharmacist entering this field must bring education, culture and scientific training to a high order, but a place is assured for those who can measure up to its possibilities.

In these large centers of medical service we see a number of pharmacies being established which reflect the best traditions of the profession. They are frequently referred to as "ethical pharmacists," but preferably as "professional pharmacies," and a limited number of these will continue to be the pride and ideal of all of us. May I again suggest that the same standards and very similar equipment and stock may be assembled at little added cost into a "professional section" of any drug store if the pharmacist is interested. He can thus re-establish

an atmosphere to which the public will respond and where they will come with confidence to have prescriptions filled, to buy sick-room necessities, medicines and supplies for the baby and the home, help for the eradication of insect pests, efficient antiseptics and disinfectants, and many other items associated with the maintenance of health.

The hospital, too, must more and more use highly trained pharmacists who perform services of outstanding importance in the well-organized hospital. Proper planning and organization in this part of the hospital program has repeatedly demonstrated a saving, in cost of drug supplies, many times in excess of the installation and maintenance of costs of the department.

Pharmacy must actively co-operate with medicine in developing this program and seeing that it is a requirement of every first-class hospital in the country. Here lies one of the greatest fields for professional pharmacy in the future.

Pharmacy has been unable to understand the reasoning which a few years ago swept the teaching of therapeutics from the majority of the medical colleges of this country. True, the new departments of pharmacology were expected to supply this need, and perhaps so drastic a move was necessary to free the schools from the continuance of teachings no longer accepted by the new group who demanded physiologic evidence of every therapeutic claim.

Happily this extreme view is passing; more tolerance and greater wisdom has come and medicine still accepts a large and important group of therapeutic agents and is teaching the doctor how to use them scientifically and with results.

Pharmacy also has a real lesson to learn from the doctor, and unless it is learned the future pharmacist, however thoroughly trained today, will soon find himself out of step with the times. Medicine has intensively adopted the policy of keeping up to date by means of graduate schools, short courses in the latest developments of medicine, unbelievably helpful lectures and demonstrations at every association meeting, local, State and national, and almost 100 per cent. membership and attendance. When is pharmacy ready to adopt a similar program? It is the answer to many of pharmacy's problems of today.

How about the "specialty"? These must not be condemned as a class. Many of the most dependable remedies of today were developed through the stimulus and the financial return made possible by the "specialty." Other so-called "specialties," however, are a menace to medicine and pharmacy and again the solution is largely in the hands

of the retail pharmacist. He is supplied with the Pharmacopœia and the National Formulary; these are intended to provide standard remedies of every type, up to date, complete, efficient and palatable, a reliable preparation for practically every therapeutic need. Every recent survey of prescriptions and a study of the formulas and catalogues of physicians' supply houses proves that the official substances are still used far in excess of any other therapeutic agent.

If all retail pharmacists, or if 25 per cent. of them, were awake to this situation, they would be detailing the doctors of the country with official preparations and samples and "specialties" would be less a factor.

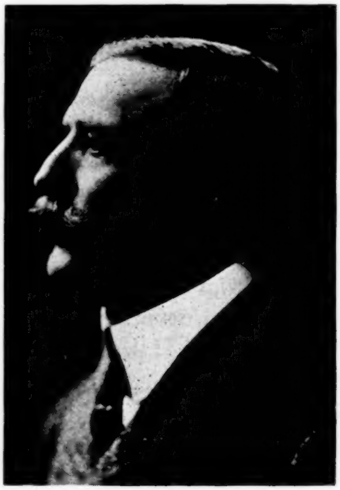
As to "chain stores" and "cut prices," I believe the answer is sound business education. The independent pharmacist, adding personality to a business efficiency equal to that of the "chain," need have no fear of competition.

The future of pharmacy is bright if we are willing to pay the price. Integrity, thorough training, happiness in the service of humanity, and willingness to work; this combination will insure a successful future to any pharmacist.

As the recipient of the medal this year, I am not unmindful of the honor it conveys, but much more am I impressed by the sense of added obligation it places upon its recipients. To justify the judgments of friends, to lend distinction to the memory of a great man, and to serve pharmacy as he served it, is a goal and a stimulus for intensified effort.

HENRY S. WELLCOME KNIGHTED

MANY FRIENDS and associates of Dr. Henry S. Wellcome in the United States will be gratified to learn that knighthood was conferred on him in King George's New Year honor list in recognition of his generous support of medical research.



Henry S. Wellcome

Dr. Wellcome is the head of Burroughs, Wellcome & Company, London, manufacturers of fine chemicals and galenicals, with establishments in the United States, Italy, Canada, Australia, India, China, and other countries.

It is interesting to note that Dr. Wellcome is a native of Wisconsin and became a British subject by naturalization. He was graduated at the Philadelphia College of Pharmacy and Science, and from the beginning of his career Dr. Wellcome made original scientific research and strictly ethical methods the foundation of his life's work.

Dr. Wellcome's American interests are wide and varied. He is a director of the Gorgas Memorial Institute of Tropical and Preventive Medicine, Washington, which operates scientific laboratories at Panama for research work touching causes and prevention of tropical diseases.

In connection with the monumental sanitary work of General Gorgas in Panama it is recalled that at one time an attempt was made to cut down appropriations which would have seriously handicapped the progress of the work. The Secretary of War, the Honorable J. M. Dickinson, who knew of Dr. Wellcome's experience and interest in tropical research, asked him, while in Washington in 1910, to visit Panama and make a thorough detailed inspection of the conditions and methods of operation in all sections of the Canal Zone and to submit an unbiased report based on his personal observations.

Dr. Wellcome is a life member of the American Pharmaceutical Association and has taken an active interest in its scientific work since the beginning of his membership in 1875. During the past several

years Dr. Wellcome has taken an active interest in the campaign for the establishment of a national headquarters building for the association in Washington, to be known as the "American Institute of Pharmacy." Dr. Wellcome's interest in this project has been evidenced by words and deeds. At the last annual meeting of the Association held in Miami, Fla., during July, 1931, Dr. Wellcome was elected honorary president of the American Pharmaceutical Association.

The childhood of Dr. Wellcome was spent in a frontier settlement of Minnesota, and here his interest had its inception in archæological subjects and this has continued to develop and find expression in some of Dr. Wellcome's larger undertakings, which are well known to archæologists. In one of his expeditions to the Sudan he discovered several prehistoric Ethiopan archæological sites in the Upper Nile Region. Excavations here were carried out under his personal direction, and the researches have been fruitful in results. The extent of these archæological diggings may be gathered from the employment of a technical and administrative staff of twenty-five Europeans and more than 3000 native workmen. Prof. G. A. Reisner, of Harvard University, writing of this work, said, "The excavations carried on by H. S. Wellcome have thrown unexpected light on early Ethiopian history in this region. For the first time a scientific archæological record has been made of a site in the interior of Africa."

As a result of his early contacts on the frontiers of civilization Dr. Wellcome came to know the American Indian. For a great many years Dr. Wellcome has taken a personal interest in the welfare of a tribe of Indians in Alaska. In 1887 he published a work of some 500 pages on these Indians under the title of "The Story of Metlakahtla," which relates how this tribe of savages was transformed into peaceful, industrious dwellers and tillers of the soil through education and the adoption of Christianity.

Dr. Wellcome has received world-wide recognition for his great service to science and medicine, for his interest in missionary enterprises, and for his personal work in medical research, the history of medicine, and for his archæological and ethnological explorations and studies.

He is an Honorary Fellow of the Royal Society of Medicine, London, and also an Honorary Fellow of the Royal Society of Tropical Medicine and Hygiene, London, and has been elected Honorary Corresponding Doctor of the College of Medical Men, Madrid; Vice-President of the Society for Nautical Research; Fellow of the Society

for Antiquaries, Royal Geographical Society, Royal Anthropological Institute, the Zoological Society, etc. The honorary degree of Doctor of Laws was conferred by the University of Edinburgh in 1928.

In connection with Dr. Wellcome's various American interests it has been a custom for him, for many years past, to spend a part of each year in Washington. He is a member of the Lotus Club, New York, and of the Cosmos Club, Washington.

Apart from the research and experimental laboratories of the establishments of Burroughs, Wellcome & Company, which have to their credit an immense number of important original researches, Dr. Wellcome has established a number of scientific institutions which are co-ordinated and under separate and distinct direction, which include the following:

The Wellcome Physiological Research Laboratories, London (1894);

The Wellcome Chemical Research Laboratories, London (1896);

The Wellcome Historical Medical Museum, London (1913);

The Wellcome Bureau of Scientific Research, London (1913); and the Museum of Medical Science (including Tropical Medicine and Hygiene) (1914); and the auxiliary Entomological Research Laboratory at the Royal Horticultural Society Gardens, Wisley, Surrey (1915);

The Wellcome Tropical Research Laboratories, Khartoum, Anglo-Egyptian Sudan, Upper Nile, Africa (1901); and the fully equipped auxiliary Floating Tropical Research Laboratory on the Upper Nile and its tributaries (1906).

In November last year in London the cornerstone was laid for a new building which is to be known as The Wellcome Foundation Medical and Chemical Research Building. The cornerstone was laid by the Rt. Hon. Lord Moynihan, of Leeds, president of the Royal College of Surgeons, England. The new building, which is to measure 225 feet by 135 feet, will furnish additional accommodation required to coordinate and extend the activities of the Wellcome Chemical and Medical Research Laboratories.

CORRESPONDENCE

December 10, 1931.

To the Editor of the American Journal of Pharmacy:

I have been greatly interested and somewhat surprised by the editorial of Dr. Kilmer on the subject of "The Druggist's Place in First-Aid."

As far as I can interpret it, his idea seems to be that the druggist should never touch an injured person, but should spend himself as a teacher of first-aid, "a voice crying out to all mankind, 'Protect yourself and help your neighbor.'" Among ordinary people there is a feeling of contempt for those who preach virtues that they are unwilling to practice; some even call them hypocrites. There is also a growing sentiment in educational circles that a man who does not know anything about a subject is not the proper person to teach it to others.

If the druggist knows nothing about first-aid, certainly he is not qualified to act as a teacher to the various organizations Dr. Kilmer mentions. If he does know something about the subject, is he not reprehensible if he "locks his doors against the crowd" and allows an injured man to slowly bleed to death in front of his store while he busies himself telephoning for a police patrol or an ambulance? Dr. Kilmer refers to the fact that a druggist who applies first-aid may expose himself to the criticism of the court if the results are unfortunate; I certainly feel that the courts would criticise a druggist who refuses to make any effort to save life in an emergency.

Dr. Kilmer advocates that Boy Scouts, Girl Scouts, women's clubs, etc., should be given training in first-aid. If they are not allowed to use it, what is the advantage of such training? If a Boy Scout renders first-aid, would he not be practicing medicine just as much as a druggist who renders the same service? I am not a lawyer, but I understand that the courts permit pharmacists to administer medical attention in emergencies.

I agree with Dr. Kilmer that much harm has been done by well-meaning medical efforts of ignorant persons, but is this not an argument for more, rather than less, education of the pharmacists? I teach my own students that it is of the greatest importance to know

what *not* to do, but at the same time I believe I am justified in teaching them how to do certain tasks which I feel they might be expected to perform.

H. C. WOOD, JR.

[This letter was submitted to Dr. Kilmer, who responded with the following communication.—*Editor's Note.*]

To the Editor of the AMERICAN JOURNAL OF PHARMACY:

With respect to Dr. Wood's communication in reference to the article which I wrote on the subject of "The Druggist's Place in First Aid," it is perhaps true that I did not make myself quite clear in my previous communication. My intent, however, was to show that for the druggist to apply first aid to an injured person who might be brought into his store entailed an economic loss and other complications. In such a case, the druggist would receive no pay for his service in attending to the injured person or for the material which he might use. His store would be mussed up, and he would probably acquire unpleasant notoriety.

Further than this, he might render himself liable to criticism by the medical profession, with an additional liability to suits for damages. In nearly every accident case there is usually an ambulance-chasing lawyer ready to bring suit for damages, and the druggist is an easy mark. There have been numerous instances where druggists have found themselves defendants in suits of this character.

There is, however, a creditable and profitable course open to the druggist. He may become a teacher, but not a practitioner, in his own person or in his own store.

He may learn enough of first aid to be able to tell his customers what to do, and may sell them the material with which to do it.

He may sell manuals, household first aid cabinets, autokits, and first aid appliances of many kinds. He can teach his customers to be prepared. He may go so far as to teach first aid to Boy Scouts, Girl Scouts, women's clubs, mothers, and to everybody. His pupils can be taught to apply first aid without let or hindrance. The druggist can make money out of his pupil's labors.

This I take to be modern first aid, which requires that the injured shall be cared for at the spot where the accident occurred, and shall then be conveyed to a hospital, to a physician, or to some other point for permanent restoration and care.

Through the pursuance of such a course, everybody will be kept happy and satisfied. The druggist will thus become a first aid preacher and teacher, but not a practitioner.

F. B. Kilmer,
147 College Avenue,
New Brunswick, N. J.

December 17, 1931.

SCIENTIFIC AND TECHNICAL ABSTRACTS

New Drug Addiction Treatment—A new method for the treatment of morphine addiction has been suggested to the National Academy of Sciences by Dr. Wilder D. Bancroft, Dr. Robert S. Gutsell and J. E. Rutzler, Jr., of Cornell University. Their investigations with dogs showed that the chemical, sodium rhodanate, would prevent withdrawal symptoms when animals addicted to morphine were abruptly deprived of the drug.

"The way is clear for the use of sodium rhodanate in the treatment of drug addiction in human beings," their report, published in the proceedings of the National Academy of Sciences, concludes after describing the investigation in detail.

A major difficulty in "curing" drug addiction has been the fact that when the addict is deprived of the drug to which he has become habituated he suffers intolerable pain, nervousness, sleeplessness and prostration. These withdrawal symptoms are only relieved by the drug from which he is trying to be freed. Various methods of bringing the patient safely through this stage have been advocated but none has been unqualifiedly successful.

Sodium rhodanate, given a short time before the morphine is withdrawn, prevented the onset of withdrawal symptoms in the morphine-addicted dogs.

The use of this chemical resulted from Dr. Bancroft's earlier study of insanity. He believes that many brain disorders are caused by the jelly-like protein substances of the brain being either too thick or too thin. In morphine addiction, these brain proteins are too thick, and sodium rhodanate thins them, Professor Bancroft has found. This drug's successful use in serious mental disorders was recently announced by Drs. H. Beckett Lang and John A. Paterson, of Willard, N. Y., State Hospital.—(*Science Service.*)

Vitamin Made in Laboratory—A vitamin has been manufactured in the laboratory by strictly chemical methods for the first time in history, Drs. Charles E. Bills and Francis G. McDonald, of the Mead, Johnson & Company Research Laboratories, Evansville, Ind.,

reported to the recent meeting of the American Association for the Advancement of Science.

They synthesized vitamin D, the so-called sunshine vitamin, by treating ergosterol with nitrogen monoxide gas and obtained the potent vitamin without the use of ultraviolet radiation. At present vitamin D is made by the action of ultraviolet light on ergosterol, whereas before the relationship between vitamin D and sunshine was discovered five years ago, children had to take cod liver oil to obtain vitamin D that prevents rickets.

The synthesis of the vitamin is carried out in solution with methyl alcohol, ether and ethyl acetate at low temperature and with rigid exclusion of oxygen.

An extremely pure non-crystalline preparation of vitamin D was described by Drs. Bills and McDonald. In company with four European laboratories, the American scientists have also produced crystalline vitamin D. The purest of these substances is claimed to be the most potent drug known.—(*Science Service.*)

Divinyl Oxide—A new general anæsthetic for use in surgical operations, which is said to be more rapid and efficient than ether, chloroform or the anæsthetic gases, has been discovered in accordance with a prediction of Dr. C. D. Leake, professor of pharmacology at the University of California Medical School.

The new anæsthetic is called divinyl oxide. It is chemically related to ether and ethylene and will probably be given in the same way that ether is. However, it is said to be superior in several ways to these anæsthetics.

Recovery is more rapid when divinyl oxide is used for an operation than when ether is used. There is less excitement and less nausea with the new anæsthetic. There is also less irritation of the lungs and less disturbance of the body's chemical equilibrium. The heart action is not greatly changed.

Divinyl oxide is a liquid which boils at a low temperature. It is inflammable and as explosive as ether.

While investigating the anæsthetic action of ether and ethylene at the University of Wisconsin, Dr. Leake predicted that divinyl oxide, the chemical relative of these substances, would prove valuable.

At his request it was produced in a chemically pure form by Dr. R. T. Major and Dr. W. L. Ruigh, of Princeton University, and the

Merck Laboratory for Pure Research at Rahway, N. J. It was then given a trial and as a result the world has a new anæsthetic.

Divinyl oxide may be obtained from the common garden variety of leek, but only by a laborious process. It has been found more practicable to obtain it by another method.

Clinical evaluation of the new anæsthetic is still proceeding at the University of California Hospital under the supervision of Dr. H. C. Naffziger, Professor of Surgery, and Dr. D. Wood.—(*Science Service.*)

GROWTH-CONTROLLING EXTRACT BEING TRIED IN CANCER—A substance having remarkable powers of controlling the growth of living beings and of possible value in the treatment of cancer is being investigated in the laboratories of the Royal College of Surgeons of England and at King's College, London. The discovery is due to a young biochemist, J. H. Thompson, who has found that an extract of the parathyroid gland of cattle will restrict or prevent growth without endangering the health of the organism.

The most important application of this discovery lies in the treatment of cancer. It is being tested in several London hospitals with very encouraging results. Sir Arthur Keith has further suggested that it may be of value in the treatment of the disease called acromegaly or gigantism which is due to abnormal functioning of the pituitary gland.

The effect of the extract was first observed on rats and rabbits, then on watercress. At the suggestion of Prof. Julian S. Huxley it was tried on the axolotl, a form of salamander. In all these cases the growth-retarding effect has been very marked. Treated rabbits have remained at about half the size of their untreated brothers and sisters. The germination of watercress seeds is entirely stopped by a 20 per cent. solution of the extract.—(*Science Service.*)

USE OF ANTISEPTICS IN THE CONJUNCTIVAL SAC—F. Ridley (*The British Medical Journal,* November 21, 1931) describes some experimental work to determine the value of various antiseptics in the conjunctival sac. The first one related to fluorescein, and showed that even in the normal eye, with the minimum of irritation, the fluorescein which could be introduced into the conjunctival sac was diluted thirty-two times in eleven minutes. With argyrol, one-fifth became one-tenth

in about forty seconds, and one-tenth became one-twentieth in the same interval. Mr. Ridley showed the results obtained with a number of substances in common use in the eye, stating the maximum dilution to kill the staphylococcus or streptococcus in fifteen minutes in 10 per cent. serum at 34° C. From these experiments it appeared that zinc sulphate in 1 per cent. strength had no killing power, but would inhibit down to a dilution of 1 in 600, and the same was true of many other substances. The most effective substance proved to be silver nitrate; 10 per cent. silver nitrate would kill down to a dilution of 1 in 1000 and inhibit down to 1 in 25,000 or even 1 in 50,000. It was usual to ascribe the beneficial action of silver nitrate to the desquamation it produced, but it was none the less a very efficient germicide. Argyrol and protargol might exert an inhibiting action for a quarter of an hour, but silver nitrate in the eye might fairly be assumed to exert a powerful inhibiting action. As to the effect of these substances on the natural protective agent in the tears, silver nitrate destroyed it in high solution, but a concentration of 1 in 25,000 silver nitrate, which was actively inhibitory to the organisms, did not affect the bactericidal power of the tears. He concluded that silver nitrate, argyrol, and protargol were the only effective antiseptics in this connection, and of these silver nitrate was the most efficient, and might be used, he thought, with benefit in solutions weaker than those commonly employed.—(*Chem. and Drugg.*)

PELLITORINE: THE PUNGENT PRINCIPLE OF ANACYCLUS PYRETHRUM—In an article published in *The Journal of the Chemical Society* John Masson Gulland and Gerald Uern Hopton describe research undertaken by them on the pungent principle of pellitory root. In passing they discussed the work on this subject previously done by Buchheim ("Arch. exp. Path. Pharm.," 1876, 5, 455), by Dunstan and Garnett ("J. C. S.," 1895, 67, 100), and by Schneegans ("Pharm. Zeit.," 1896, 41, 668), all of whom obtained mixed products of a waxy or resinous character, with a tendency to crystallise. The last investigator produced a purer product.

In the present investigation Gulland and Hopton evaporated an alcoholic extract of the powdered root to a syrup, extracted this several times with ether, the acidic substances were removed from the ethereal solution, and the ether was evaporated. The residual syrup was distilled under highly reduced pressure (0.2-0.5 mm.), and the distillate

was subjected to a series of fractionations. Ultimately fractions were obtained, which rapidly crystallised in the receiver, and recrystallisation of these from light petroleum ether yielded colourless feathery needles of pellitorine, m.p. 72 deg. More crystals were obtained from the mother liquor. The yield is probably 0.06 per cent.

Pellitorine is flavourless, but produces profuse salivation when placed on the tongue. It is neutral in character, and is an unsaturated compound. It is slowly hydrolised by alcoholic potash, but more rapidly so by dilute hydrochloric acid into a crystalline primary amine hydrochloride, isobutylamine, an oily acid, and an oily neutral fraction.

The production of isobutylamine by hydrolysis is of interest, inasmuch as the pungent acid amines of known constitution, occurring in nature, are alike in containing an aromatic nucleus, either in the basic or acidic radical. The sole exception to this statement known hitherto is spilanthol, the pungent principle of para cress, Spilanthea acmella, Murr., another plant of the N. O. Compositæ.—(*Austr. Jour. of Pharmacy.*)

NEWS ITEMS AND PERSONAL NOTES

Dr. Abel President-Elect of the American Association for the Advancement of Science—A scientist who has advanced the knowledge of the secretions of the internal glands of the body, Dr. John J. Abel, of the Johns Hopkins Medical School, Baltimore, was recently elected president of the American Association for the Advancement of Science. He succeeds Dr. Franz Boas, noted anthropologist of Columbia University.

Dr. Abel was the first to obtain in chemically pure form the secretion of the adrenal glands, to which he gave the name, epinephrine, also known as adrenalin. He also did the fundamental work which led to its isolation, although the Japanese investigator, Jokichi Takamine, was first to obtain the substance in crystalline form.

Dr. Abel was also successful in isolating the hormone of the pituitary gland and was first to obtain insulin, secretion of the pancreas, in crystalline form. His research has extended to many other subjects.

In addition he has been an educator whose students have won distinction in many parts of the world. Dr. Abel recently announced that he would retire from teaching next fall, to devote himself exclusively to research.

He was born in Cleveland in 1857, and was graduated from the University of Michigan in 1883. He has been honored with degrees, medals and membership in scientific societies in this country and abroad. He has also founded and edited scientific journals.

American Pharmaceutical Association Officers-Elect for 1932-1933—The Board of Canvassers of the American Pharmaceutical Association, composed of C. B. Allison, Sam P. Harben, and John B. Ray, all of Texas, has announced as a result of the mail ballot for officers of the association the election of the following:

President, W. Bruce Philip, San Francisco, Calif., now of Washington, D. C.;

First vice-president, Rowland Jones, Gettysburg, S. Dak.;

Second vice-president, G. H. Frommet, Miami, Fla.;

Members of the council (for three years): J. H. Beal, Camp Walton, Fla.; C. H. LaWall, Philadelphia, Pa.; C. E. Caspari, St. Louis, Mo.

These officers will be installed at the next annual meeting of the association, which will be held in the Royal York Hotel, Toronto, Canada, during the week of August 22 to 27, 1932, and which will be a joint meeting with the Canadian Pharmaceutical Association.